Exploring community gardening as a complex public health intervention: an action research study

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Exploring community gardening as a complex public health intervention: an action research study

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"It's like you breathe all the badness out, and breathe all the goodness in".

Participant 19

Abstract

The aim of this thesis was to involve local people in developing a tailored community gardening intervention in County Durham, to evaluate the feasibility and acceptability of this intervention, and explore perceived outcomes from participation. A mixed methods approach was used, with three studies undertaken.

Study One consisted of three focus groups in community venues. Three themes emerged which informed intervention design. '*Nourishing Neighbourhoods'* was the resultant six-month community garden intervention within which Study Two and Three were embedded, utilising a non-experimental pre-test/post-test design.

Study Two aimed to evaluate the feasibility and acceptability of the intervention across four sites. 41 participants were recruited, 36 started the project (88 % retention) and 28 remained engaged at endpoint (76 % adherence). Attrition stopped by week eight. There was no increase in fruit and vegetable consumption, no change in BMI scores, a reduction in time spent in moderate physical activity, walking and sitting and an increase in vigorous physical activity. There was an improvement in both physical and mental components of quality of life, with strong emphasis on improved social functioning.

Study Three used pre- and post- intervention focus groups to evaluate overall perceptions of the intervention, engagement with different intervention components, and exploration of the perceived outcomes from participation. Five main themes emerged.

Findings demonstrated that *'Nourishing Neighbourhoods'* used feasible and acceptable methods to recruit and retain participants, and collect data. In addition, community gardening has the potential to have a positive effect on health and wellbeing outcomes. The physical act of gardening is not necessarily the motivating factor; meeting new people, developing skills, 'me time', and being involved in a family activity are important. Community involvement developing the intervention is crucial to encourage ownership, responsibility and sustainability. Older people, who are usually hard to reach, were more likely to engage, which could be of importance when tackling the growing pressures of an ageing population.

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Statement of Copyright

CHAPTER ONE: INTRODUCTION

In 2010, I was working for a local charity in County Durham called Groundwork North East (GNE). The coalition government was announcing an emergency budget, and it was evident very quickly that cuts to public health services would be coming. The third sector (i.e. voluntary or non-profit) was going to take a hit, and with that, services which we provided that we believed were essential were going to suffer as a result. Efficiency savings were needed across all sectors. The Prime Minister at the time, David Cameron talked about the need for a 'Big Society'. This idea became the flagship policy of the government, with an intention to create a climate that empowered local people and communities, building a 'big society' that would take power away from politicians and give it to the people (Prime Minister's Office, 2010). Cameron called for volunteers and philanthropists to step forward to help re-build communities:

> *"There are the things you do because it's your passion. Things that fire you up in the morning, that drive you, that you truly believe will make a real difference to the country you love, and my great passion is building the big society." (BBC News, July, 2010).*

Critics argued that the 'Big Society' ideology was a cover up for the massive spending cuts that the country was facing. The general secretary of Unison argued:

> *"Make no mistake, this plan is all about saving money. The government is simply washing its hands of providing decent public services and using volunteers as a cut-price alternative." (BBC News, July 2010).*

The nature of the financial cuts led to reports that those at the lower end of the income spectrum were experiencing a worsened financial situation (Belfield *et al.*, 2015), which had led to a widening of social inequality in a country that was unequal to start with (Dorling and Dorling, 2015). The austerity measures introduced in the UK (and other parts of the world), are not distributed evenly, spatially or socially (Bambra and Garthwaite, 2015). Pearce (2013) highlighted that the communities in the most disadvantaged areas of the country would see local authorities hit hardest by the cuts, with Hudson (2013) identifying the North East as an area that would suffer from further inequality.

I decided to embark upon this research project at a time when I was working for GNE, whose purpose was to facilitate local projects based in a community setting which aimed to have a positive impact on the health and wellbeing of individuals. Although those involved with the GNE projects appeared positive about them, their positive impact on health and wellbeing was assumed. In my capacity as a GNE project leader, I was asked to prioritise projects which had the greatest impact on health and well-being. This process lead to my increased curiosity around the evidence base, and this led to my desire to conduct a significant research project on this topic. This thesis is an exploration of how a simple activity such as gardening can contribute in part to the solution of addressing a myriad of complex health problems, both physical and mental, at a time of unprecedented cuts to public spending.

This thesis sets out an innovative action research project, engaging with communities in County Durham to involve local people in designing a community gardening programme, utilising a mixed methods approach. I have brought together findings from three studies to explore the impact that communities can have on developing a public health intervention as well as describe the feasibility

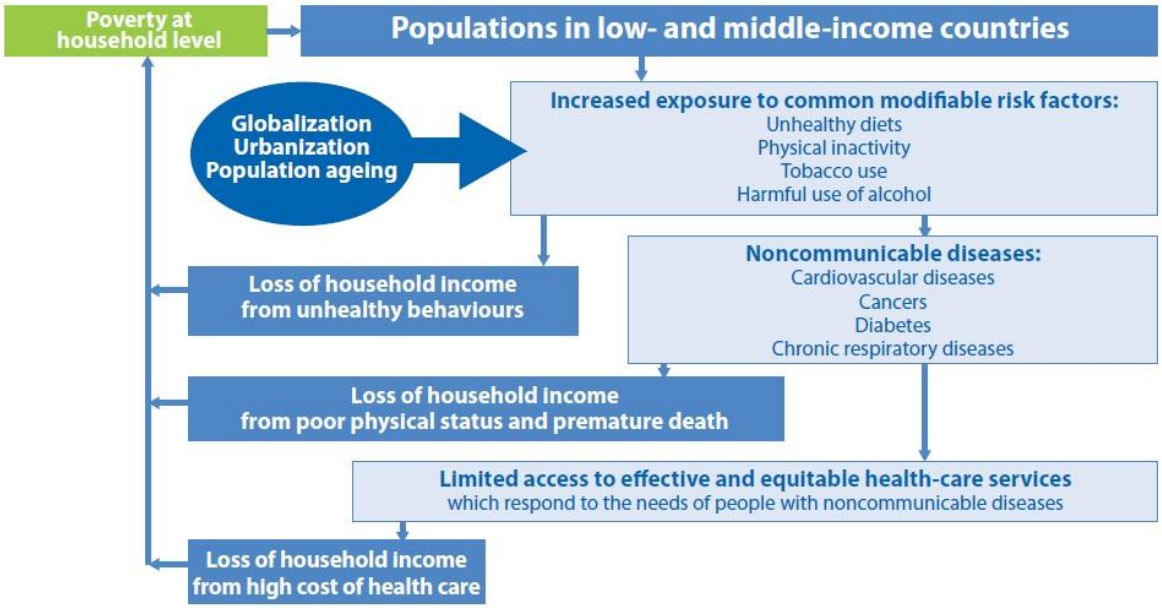
and acceptability results of a community gardening programme which has the aim of improving health and wellbeing outcomes.

1.1 Context

1.1.1 Global Health context

Noncommunicable diseases (NCD) are the leading causes of death globally, killing more people each year than all other causes combined (WHO, 2011). Contrary to popular belief, nearly 80% of NCD deaths occur in low- and middle-income countries. The World Health Organization (WHO) identified four behavioural risk factors that are pervasive aspects of economic transition, rapid urbanization and 21st-century lifestyles: tobacco use, unhealthy diet, insufficient physical activity and the harmful use of alcohol, which can be seen below in Figure 1.1:

Figure 1.1: How NCDs contribute to poverty and how poverty contributes to NCDs, Global Status report on NCDs 2010, WHO, April 2011, page 35



In August, 2008, the WHO Commission on the Social Determinants of Health published a three year investigation into the social detriments to health in a report titled ‘Closing the gap in a generation: Health equity through action on the social determinants of health’. The report noted that health inequalities were to be found all around the world, not just the poorest countries, but even in wealthy nations such as the UK. “The greater the social disadvantage, the worse the health”, (p.31):

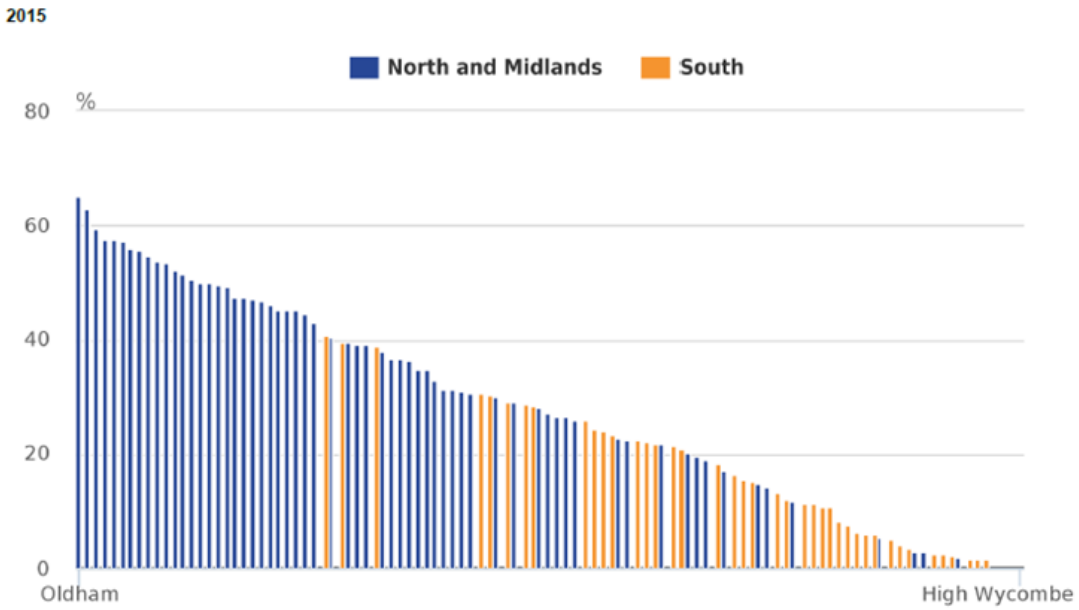
> *“In rich countries, low socioeconomic position means poor education, lack of amenities, unemployment and job insecurity, poor working conditions, and unsafe neighbourhoods, with their consequent impact on family life”. (p.31)*

1.1.2 Health in the UK

The population of the UK is ageing, with 10.8 million people aged 65 and over (ONS, 2013), and more pensioners currently residing in the country than there are children under the age of 16 (ONS, 2016a). In addition, there are an increasing number of people living with NCD’s, such as diabetes, chronic obstructive pulmonary disease (COPD), arthritis and hypertension. These conditions will put a massive strain on public finances (Simmonds *et al.*, 2014).

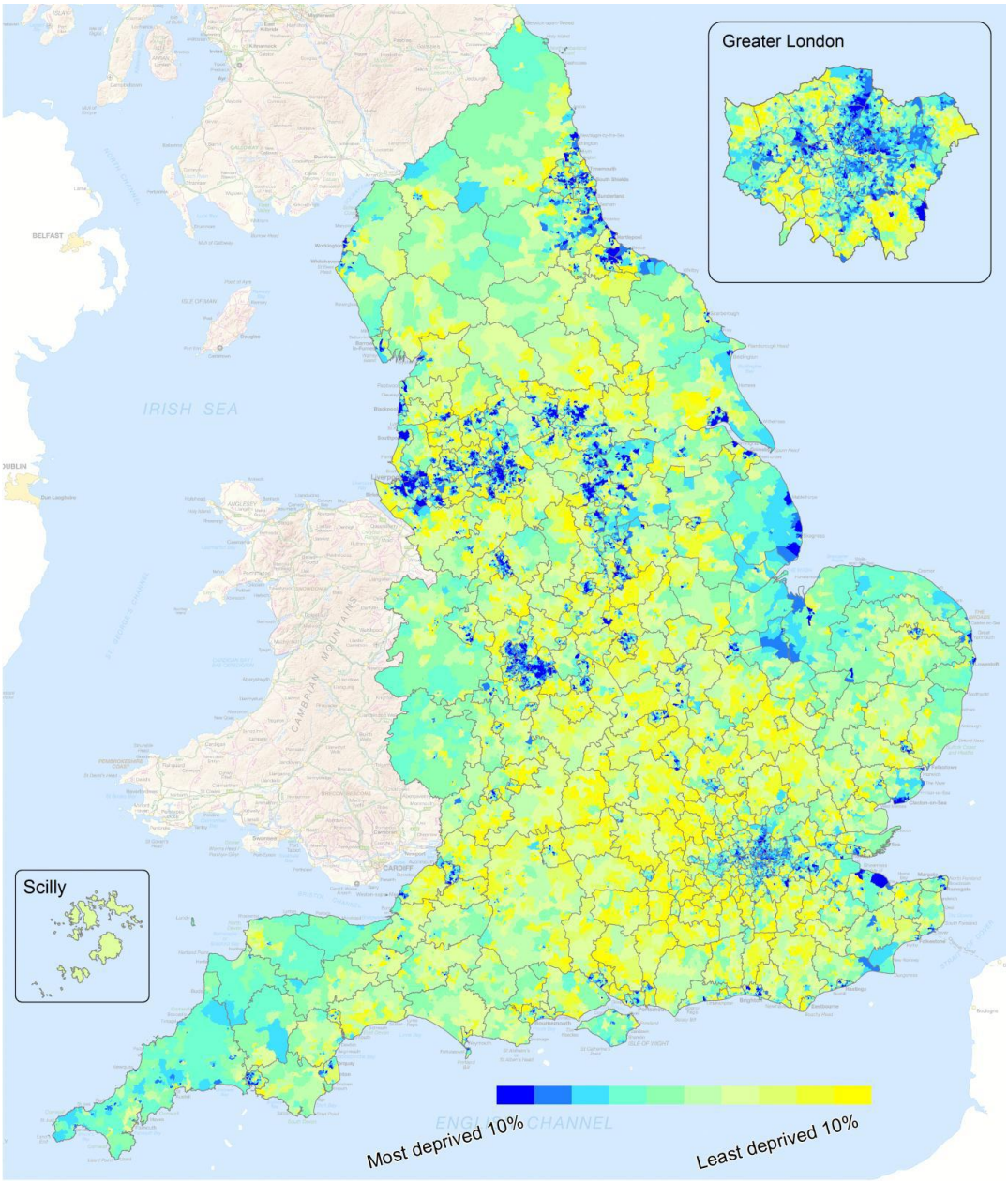
The North East of England, has a large proportion of the most deprived communities in England (IMD, 2015), demonstrated in Figure 1.2.

Figure 1.2: Proportion of Low Super Output Areas in the most deprived 20% nationally for towns and cities in England by region, Office for National Statistics. Towns and Cities Analysis, March 2016, page 13.



In the 2015 English Indices of deprivation report (IMD, 2015), County Durham was named as one of the most deprived communities in England. County Durham has a population of approximately 518, 000 and is classified as having a worse than average level of deprivation (PHE Health Profile, 2016). Collectively, the North of England scores highly on indices of deprivation and has consistently done so over numerous years, which is highlighted in Figure 1.3.

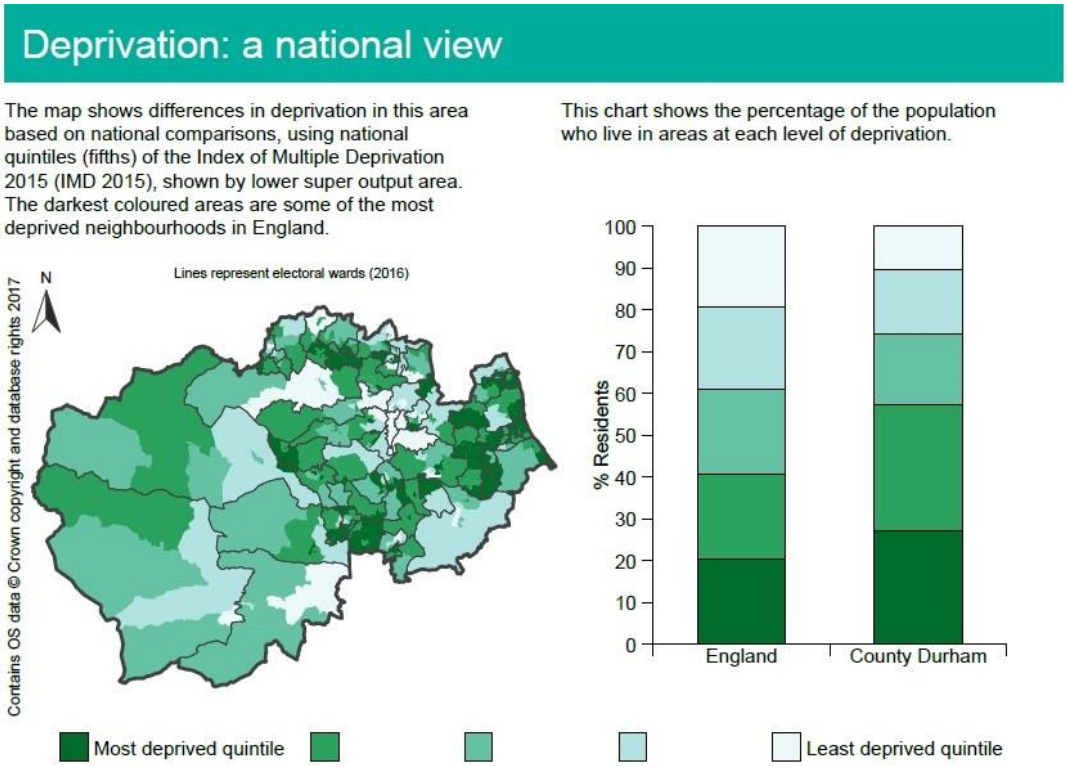
Figure 1.3: A geographical representation of the most deprived to the least deprived locations in England, IMD 2015 Info graphic, page 4.



Although in national comparisons, County Durham is often regarded as deprived it should be noted that there is “pocket deprivation”, a term used when a minority of patients in a general practice list live in areas of severe socio-economic deprivation (Watt, 2011). County Durham has a spread of the most deprived and least deprived populations within very close proximity. For example, life expectancy is 7.9 years lower for men and 7.7 years lower for women in the most deprived areas of County Durham compared to the least deprived areas (PHE

Profile 2017). When a global deprivation index is reported for the area, the implication is that the level of deprivation may be regarded as similar to other areas but in fact it is skewed by the bi-polar distribution. This difference in deprivation levels is shown in figure 1.4, were the differences in deprivation across the county are shown, as well as the higher levels of deprivation compared to the national average.

Figure 1.4: A look at the deprivation levels across County Durham. Adapted from Public Health England's Health Profile of County Durham (2017), page 2.



1.1.3 International Policies on Health

In May 2017, WHO launched the process to develop a new Global Action Plan to promote physical activity (Foster *et al*., 2017). The argument for international action is based on the evidence that NCD reduction is not on target. One of the key risk factors for NCDs, physical inactivity, is part of the problem, as it continues to rise in Europe, North and South America, Asia, Australasia and Africa (Reis *et al*., 2016).

This links in with the 2030 Agenda for Sustainable Development, with a commitment of 17 goals made in 2016 by world leaders to come together collectively to promote physical activity (United Nations, 2015). Within the goals, 'universal access to green space' was highlighted as a priority. In addition, the report argued that community involvement in planning and implementation was critical to the success of the plan.

1.1.4 National Policies on Health

A number of national public health policies encourage 'outdoor use' to avoid or ameliorate physical and mental health problems (Faculty of Public Health, 2010; Natural England 2016). Other national policies which discuss the importance of health and the need to make changes to improve public health include:

-The Foresight report 'Tackling Obesities: Future Choices', 2007

-'Healthy Lives, Healthy People', Public Health White Paper, 2010

-'Healthy Lives, Healthy People: A call to action on obesity in England', 2011

At a local level in County Durham, there are also a number of policies and strategies that feed into the health and wellbeing agenda:

- County Durham Food Partnership 'Sustainable Local Food Strategy 2014-2020

- County Durham Joint Strategic Needs Assessment 2016

- Durham County Council Joint Health & Wellbeing Strategy 2013-17

- County Durham Plan 2016-2019

In addition to national and local policies, it is also the responsibility of policy sectors outside the public health domain to help change the environmental characteristics that have an impact on health.

1.2 Socioeconomic inequalities in health

The term health inequalities is sometimes used to describe the fact that health varies between individuals. However, the term is more usually understood to refer to the systematic differences in the health of groups occupying unequal positions in society. WHO has defined health inequalities as the 'differences in health status or in the distribution of health determinants between different population groups'. (WHO, 2017a). The National Institute of Health and Care Excellence defined health inequalities as 'the differences between people or groups due to social, geographical, biological or other factors' (Nice, 2012). Such differences can have an impact on an individual's health, with some factors being permanent, such as ethnicity, and others with the potential to change, such as social and geographical influences.

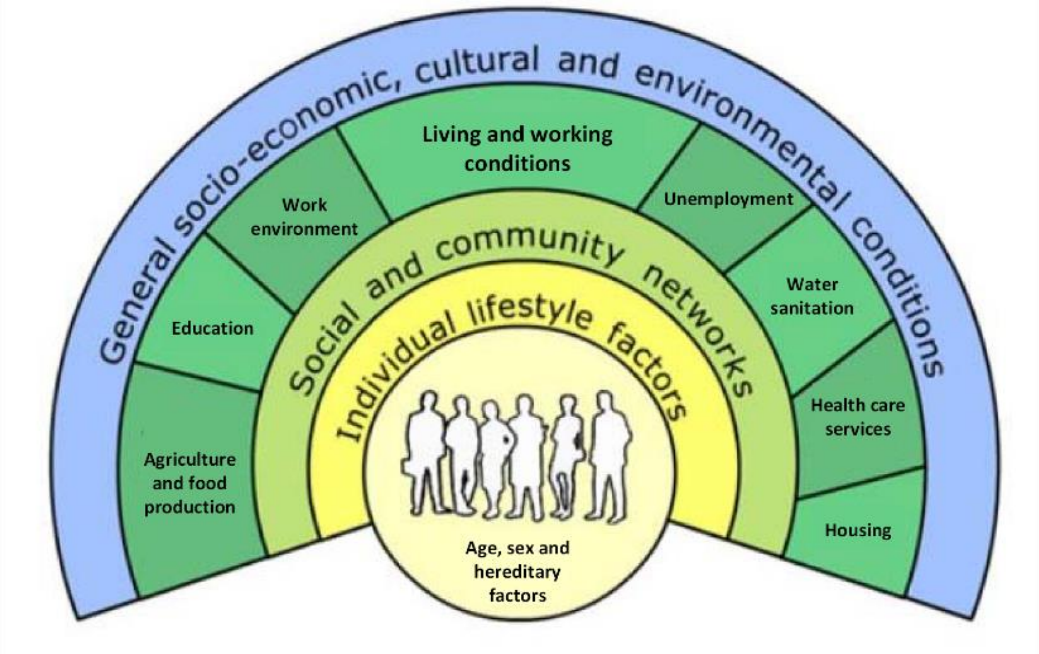
Low-income, poor educational attainment, unemployment, racial and ethnic minorities, disabled, lesbian, gay, bisexual, and transgender (LGBT) communities, and other under-served populations have reduced access to healthcare and suffer poor health outcomes across their lifespan (Riva and Curtis, 2012). Subsequently, when these populations do get sick, they are less likely to have access to quality healthcare and suffer further risk of increased rates of morbidity and mortality (Riva and Curtis, 2012).

In under-served areas, increased pressure on healthcare systems is applied due to high illness prevalence and the wider spectrum of illnesses encountered. In the UK, the role of hospitals has changed as the majority of chronic illness is now managed in the community (Pearson and McKinley, 2010). Since 1970, NHS GP practices in deprived areas have received increased funding per patient but the debate remains whether the NHS should allocate funding to tackle health inequalities or ensure equitable access to healthcare (Kings Fund, 2012).

1.3 What are the social determinants of health?

The social determinants of health are the amalgamation of conditions that an individual is born into, grows up within, lives and continues to work in. These conditions include education, housing, financial security, the built environment and the health system. These conditions are shaped by politics, social policies and economics. It has now become evident that the various social determinants and their variance across populations are responsible for significant levels of unfair health ‘inequities’ (Marmot Review, 2010). Figure 1.5 depicts the well-known Determinants of Health model (Dahlgren and Whitehead, 1992), which outlines the various factors and conditions.

Figure 1.5: The Determinants of Health, Dahlgren and Whitehead (1992)



The Marmot Review into health inequalities in England (Marmot Review, 2010) proposed an evidence-based strategy to address the social determinants of health, the conditions in which people are born, grow, live, work and age and which can lead to health inequalities. The report, titled 'Fair Society, Healthy Lives', proposed a new way to reduce health inequalities in England post-2010. It

argued that, traditionally, government policies had focused resources only on some segments of society.

To improve health for all and to reduce unfair and unjust inequalities in health, action is needed across the social gradient (Local Government Association, 2010). Action is therefore needed across the six key policy objectives cited in 'Fair Society, Healthy lives' (Marmot Review, 2010) which are:

-Give every child the best start in life

-Enable all children, young people and adults to maximise their capabilities

-Create fair employment and good work for all

-Ensure a healthy standard of living for all

-Create and develop healthy and sustainable places and communities

-Strengthen the role and impact of ill health prevention

It has been calculated that addressing health inequalities in the way the Marmot report suggests could save the NHS £5.5bn a year (BBC News, 2013). It is down to policy makers, public health teams and practitioners within health services to carry out the research required which could potentially improve health services across the UK, and begin to address the key policy objectives set out by Marmot.

1.4 Aspects of Health

'A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity,' is the definition that WHO used to define 'health' in 1948 (WHO, 1948). There are a number of health aspects which must be considered when attempting to address a health issue and developing a public health intervention. Other definitions of health aspects include mental, physical,

emotional, social, environmental and spiritual components. In the context of this thesis, I will be focussing on mental and physical health.

1.4.1 Physical Activity

Before discussing physical activity as an aspect of health, clarification is needed to explain the difference between physical activity, exercise and sedentary behaviour. Physical activity is defined as 'any bodily movement produced by skeletal muscles that requires energy expenditure' (WHO, 2017b). Casperson *et al*., (1985) highlighted the confusion between the different terms and concepts, and stated that exercise was a subset of physical activity. Exercise differs from physical activity because it is structured, planned and repetitive with an overall objective to improve or maintain physical fitness. Sedentary behaviour, and how to define it, has been debated, with the 2011 Department of Health Physical Activity Guidelines describing it as behaviours where sitting and lying down are predominant, involving low energy expenditure, such as watching TV, motorised transport, or sitting at the computer. It is not just simply a lack of physical activity (Department of Health, 2011a).

Lifestyle factors such as physical inactivity, smoking tobacco, and drinking alcohol are contributory factors in disease, and premature mortality and are responsible for up to 80% of long term conditions (Bird *et al.*, 2012). In the 1950's, Morris and colleagues started the interest of looking into the effect of physical activity on health (Paffenbarger *et al.*, 2001). They discovered that men in physically active jobs suffered less coronary heart disease (CHD) than men who had a sedentary job. In addition, they also observed that if CHD did develop amongst the physically active, it wasn't as severe (Morris *et al.*, 1953a; Morris *et al.*, 1953b). In 1990, the American College of Sports Medicine published their first statement around public health, stating that activities that were moderately intensive may also improve

health, and that the quantity and quality of exercise needed for fitness benefits may totally differ to obtain health benefits (American College of Sports Medicine, 1990). Today, it is viewed that the promotion of physical activity should now be a public health priority for health care systems (WHO, 2017c).

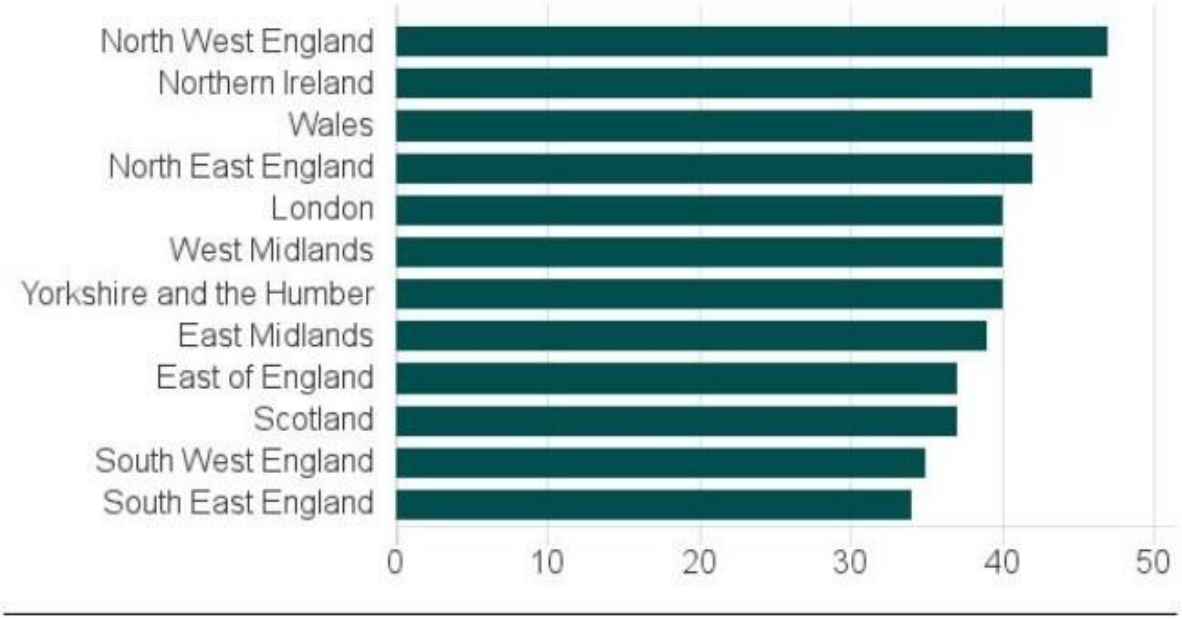
Research has shown that participation in physical activity is associated with a higher level of health-related quality of life (U.S. Department of Health and Human Service, 1996; Rejeski *et al.*, 1996). Cross-sectional studies have shown that physical activity may affect health-related quality of life by influencing its two main components: physical functioning and wellbeing (U.S. Department of Health and Human Service, 1996; Rejeski *et al.*, 1996; Ellingson & Conn, 2000; Weyerer & Kupfer, 1994).

Public health evidence for physical activity is strong; being described as a miracle drug (Pimlott, 2010) with participation in physical activity associated with reduced risk of over 20 health conditions (Cavill *et al.,* 2012), and has also been associated with a reduction in mortality and improved mental health (Department of Health, 2011b). The relationship between physical activity and reduced risk of health conditions is linear, meaning even a small increase in physical activity levels can produce health benefits (Janssen & LeBlanc, 2010; Haskell *et al.*, 2007), with the greatest benefits observed when increasing levels of physical activity in those who had previously been inactive (CMO Report, 2011) . Physical activity should not be seen as a lifestyle choice, but a clinical need that can improve both the physical and mental health of individuals.

Costs to the NHS associated with physical inactivity are reported at about 1.2 billion per year (BBC News, 2017). In addition, the report from the British Heart Foundation found that more than 20 million people in the UK are physically

inactive. The North East of England ranks as the fourth worst region for physical inactivity levels, shown in Figure 1.6.

Figure 1.6: Physical inactivity levels across the United Kingdom (percentage of region's population that is considered inactive). Taken from British Heart Foundation Physical Inactivity and Sedentary Behaviour Report, 2017



It is well known that physical activity improves both physiological and psychological well-being (Gladwell *et al.*, 2013). However, further research is required to ascertain how different environments have an impact on health. There has been a steady decline of physical activity in the Western world. Worldwide, 31.1 % of adults are physically inactive (Hallal *et al.*, 2012). The British Heart Foundation (2015) stated that 68 % of male adults in the North East of England achieved the recommended levels of physical activity, with only 48 % of women doing so- the lowest in the UK. An earlier report by The British Heart Foundation (2012) highlighted the gap between the highest earners and those with the lowest income and their activity levels. Individuals earning more money achieved higher levels of physical activity- 42 % (male) and 34 % (female), compared to those on the lowest income (31 % of males and 26 % of females).

This decline has been attributed to various causes such as technological advances in the agricultural and industrial revolutions, and the current digital revolution that is taking place (Gladwell *et al.*, 2013). Structured physical activity has moved indoors, to places such as gymnasiums, sports halls and at home. With less and less physical activity taking place outdoors, this could potentially be one of the causes for the decline in physical activity levels. There is also the potential for the environment to motivate and facilitate physical activity.

1.4.2 Diet

Nutrition is the intake of food, considered in relation to the body's dietary needs. Good nutrition comes from a having a well- balanced diet. Poor nutrition can lead to reduced immunity, increased susceptibility to disease, impaired physical and mental development, and reduced productivity (WHO, 2015a). The latest WHO recommendations for a healthy diet include reducing fat free sugars and salt intake, and increasing fruit and vegetable intake (WHO, 2015a). Current guidelines with the NHS stand at five portions of fruit and vegetables per day, but a recent systematic review suggest than 10 portions is the optimal amount (Aune *et al.,* 2017).

Scarborough *et al.,* (2011) carried out a study which suggests that poor nutrition, or diet is a behavioural risk factor that has the highest impact on the budget of the NHS, followed by alcohol consumption, smoking and physical inactivity. The study looked at costs in 2006 and 2007, and attributed 46 % of total costs within the NHS to diseases that are related to poor diet, physical inactivity, smoking, alcohol and overweight/obesity. A shocking figure of £43 billion was presented, with poor diet-related ill-health costing £5.8 billion, £3.3 billion on alcohol-related ill health, £3.3 billion on smoking-related ill health and £0.9 billion on physical inactivity-related ill health.

In addition to the financial strain that poor diet places on the NHS, it also acts as a risk factor for cancer, CHD and diabetes. It has only been in recent years that research has identified just how significant a risk factor it is. It has been estimated that poor diet is a factor in perhaps 70,000 preventable premature deaths each year (O'Flaherty *et al.*, 2012).

Those on low incomes living in the UK are more likely to have a poor diet, as evidenced by lower fruit and vegetable intakes, and a higher prevalence of dental cavities among children (Food Standards Agency, 2007). They also have, on average, a low mean age of mortality compared with those living in less deprived areas. It is estimated that as many as 10 million people in the UK live in poverty, including nearly three million children (Faculty of Public Health, 2005). Tackling food poverty is seen as key to reducing inequalities in health. Ongoing investigations suggest that there is potential to change local 'food environments' – i.e., accessibility, affordability, culture – in which people live and work, and that these interventions have a positive impact on dietary and physical activity.

1.4.3 Obesity

Obesity prevention has become an international public health priority (Kumanyika *et al.*, 2002), with chronic diseases and mental health conditions being a key economic and social burden for health services and for families and communities in the UK (Foresight 2007). More than half of the adult population in England is overweight or obese, approximately 5 % has diagnosed diabetes and almost one third suffer from hypertension (Health Survey for England, 2009). This rising trend in obesity is one of the biggest threats to the health of the population of County Durham. Estimated levels of adult 'healthy eating' and obesity are higher than the England average and 22.7 % of Year 6 pupils (aged 10-11 years) are classified as obese (Public Health England, 2013). The trend of weight problems in children

and young people is of particular concern because of evidence identifying a 'conveyor belt' effect in which excess weight in childhood continues into adulthood (Department of Health, 2008). Obesity in children is associated with increases in hyperlipidaemia, hypertension, impaired glucose tolerance, type 2 diabetes, orthopaedic complications and sleep apnoea (Summerbell *et al.*, 2003). Obesity can also have an effect on emotional wellbeing through weight related teasing and reduced self-esteem (Puhl & Brownell, 2001).

The increasing prevalence rates of overweight and obesity subsequently impacts on demand for services and cost to the NHS and wider economy. The current total annual cost to the NHS of overweight and obesity in terms of treatment and its consequences has been estimated at £16 billion (The Telegraph, 2016) with additional costs for the wider economy – for example, based on a study of London tube workers, obese individuals take an extra four days sick leave per year (Harvey *et al.*, 2010).

There is an emerging trend of increased certification of obesity as a cause of death in England (Duncan *et al*., 2010). Action to improve diet is critical to tackling obesity, a major cause of heart and liver disease, stroke, type 2 diabetes and some cancers. The Call to Action on Obesity in England (Department of Health, 2011) sets out a comprehensive approach and set of actions to tackle obesity at local and national level, for children and for adults.

1.4.4 Mental Health

National level research by Barr *et al*., (2015) suggests that inequalities in mental health may have widened since 2008. In addition to this, reported poor mental health is on the increase in the UK, yet mental health is not nearly as well understood as other areas of health. Having a low income, being unemployed, living in poor housing, low levels of education and membership of lower social

classes are all associated with a greater risk of experiencing a mental health problem (Meltzer *et al.*, 2002) The poorest fifth of adults are at double the risk of experiencing a mental health problem as those on average incomes (Meltzer *et al.*, 2002).

King *et al*., (2008) estimated the point prevalence of depression, anxiety and other non-psychotic mental health conditions amongst adults at 18 %. The complex interactions of mental health with health behaviours and with chronic diseases such as obesity and diabetes are well documented (Peluso, 2005; Heesch, 2010; Gomez-Pinilla, 2008; Bertheussen *et al.,* 2011; Ahn *et al.,* 2011;) but there are only a few public health interventions that combine the social and built environment with health promotion activities that have been evaluated in the UK (Wall *et al.*, 2009; Ashfield-Watt *et al.,* 2007; Pomerleau *et al.,* 2005; Robinson-O'Brien *et al.,* 2009). Therefore interventions that can additionally address broader mental health and wellbeing need to be explored.

A variety of treatments and coping mechanisms for mental health problems are helpful, but one survey found that more than 50 % of patients were not given any choice of treatment when they visited their GP (Rankin, 2005). According to an online survey by the Mental Health Foundation, of those visiting their GP with depression, 60% were prescribed anti-depressants, 42 % were offered counselling and 2 % were offered exercise therapy. The same survey found that 82 % of people would be prepared to try counselling, 76 % would be prepared to try exercise, 60 % would be prepared to try alternative therapies, and 52 % would be prepared to try antidepressants (Mental Health Foundation, 2005). Braunholtz *et al.*, 2004 carried out a survey of people with mental health problems and found that useful techniques and coping strategies include:

- Physical exercise

- Support from family and friends

- Medication

- Counselling or psychotherapy

- Something worthwhile to do during the day

- Peer support

- Alternative therapies

- Volunteering and working

- Hobbies

- Advice from their GP

- Spirituality and religion

A community gardening programme would align with a number of these options, and with the current literature providing a strong anecdotal case for the health benefits of such a programme, further research is essential. Gardening is a form of exercise, and mental health research that explores gardening and the association with positive physical and mental health is imperative.

Exercise has been shown to improve both physical and mental health for people with a range of mental health problems, including depression, anxiety and psychotic disorders (Mind, 2015). Research has suggested that exercise can be as successful at treating mild or moderate depression as psychotherapy or as medication (Mental Health Foundation, 2005). The National Institute for Health and Clinical Excellence recommends that patients with mild depression should be advised of the benefits of being physically active every day, with at least 150 minutes per week of moderate intensity exercise (NICE, 2013). Only 5 % of GPs

prescribe exercise therapy as one of their top three treatment responses to mild or moderate depression (Mental Health Foundation, 2005). A Mental Health Foundation survey found that a greater number of patients who had tried exercise as a treatment for depression found it very or quite effective (81 %) in comparison to 70 % for anti-depressants (Mental Health Foundation, 2005).

It is imperative that effective ways of engaging with individuals to change health behaviours and improve health and well-being are found, to prevent the trend of increasing physical and mental ill-health.

1.5 Interventions to reduce socioeconomic inequalities

There is a great deal of evidence which describes the nature of health inequalities in society, but the evidence to support effective ways to tackle such inequalities is lacking. Bambra *et al.,* (2010) identified thirty systematic reviews that described the health effects of any intervention based on the wider social determinants of health. These included water and sanitation, agriculture and food, access to health and social care services, unemployment and welfare, working conditions, housing and living environment, education, and transport. Bambra *et al.,* (2010) found that in general, the effects of interventions on health inequalities were unclear. However, it was reported that there is enough systematic review evidence to ascertain that certain categories of intervention may impact positively on inequalities or on the health of specific disadvantaged groups.

In a recent publication, Hillier-Brown *et al.,* (2014) suggested a revised framework for interventions tackling inequalities in obesity. It is important that such evidence is available to help policy-makers make decisions about the kind of policies that will help to tackle health inequalities, and also to guide future research in this area. A community gardening intervention has the potential to reduce such inequalities, and relieve the burden that the NHS is currently facing.

1.6 Definitions within the research field of community gardening

An important point that needs to be addressed before the literature review is the clarification of various terminologies used to describe being active and outdoors. 'Green space', 'green exercise', 'natural environment', 'allotment', 'community garden', and 'open space', are used to describe the research in this field. To help with avoiding confusion, I felt it was appropriate to include a section on defining these terms prior to the literature review, to assist in focussing attention on the topic of interest, community gardening.

1.6.1 Green Space

In the Oxford Dictionary (2014), 'green space' is described as, 'an area of grass, trees, or other vegetation set apart for recreational or aesthetic purposes in an otherwise urban environment'. Many health initiatives are being developed that specifically utilise green space to promote physical activity and mental health (Barton and Pretty, 2010). With increasing interest in the use of green space to promote health, there is a need to understand its effectiveness. However, this is not the focus of the present study.

1.6.2 Green Exercise

Pretty *et al.,* (2003) coined the term 'green exercise' to describe the increased benefit to health that occurs when exercising whilst being exposed to nature. Green exercise involves physical activities undertaken whilst exposed to natural environments (Pretty *et al.*, 2005). Or as Barton & Pretty (2010) later defined it, "Green exercise is activity in the presence of nature". Therefore, green exercise can be applied to community gardening but also to describe walking, running, or any other number of activities that take place outdoors. So for this particular study, 'community gardening' will always be the phrase used to explain this intervention.

As a side point, the interpretation of ‘green’ in the phrase ‘green exercise’ has raised questions, and this needs to be clarified within the thesis to ensure a consistent approach towards how the phrase is perceived. Sugiyama *et al.,* (2008) defined ‘green’ environments as vegetated areas such as parks, open spaces, and playgrounds. Following on from that, ‘green exercise’ was defined as exercise performed in environments with a greater ratio of natural to artificial elements. In addition, clarification is also required around the issue of green vs. natural. Some artificial environments are green, and not all natural environments are green, therefore the green in green exercise is not meant literally, but is simply referring to the naturalness of an environment, as opposed to an artificial environment (Bodin & Hartig, 2003).

1.6.3 Natural Environment

The ‘natural environment’ means all living and non-living things that are naturally on earth. In a narrow sense, it is an environment that is not influenced. The environment that is influenced by humans can be called "the built environment" or cultural landscape. In contrast to the natural environment, the built environment is such areas where humankind has fundamentally transformed landscapes such as urban settings and agricultural land conversion, and the natural environment is greatly modified and diminished (Hogan, 2013). Thompson Coon *et al.,* (2011) use the term ‘natural environments’ when describing a study which compare physical activity outdoors with indoor physical activity. Gardening is typically a physical activity that takes place outdoors, but does not always have to be in a ‘natural environment,’ for example, using a greenhouse to grow.

1.6.4 Allotment

One definition of an allotment is “a plot of land rented by an individual for growing vegetables or flowers,” (Oxford Dictionary, 2014). Milligan *et al*., (2004) described

allotments as ‘referring to small pieces of land rented (usually from a local authority) for the purposes of cultivation’. In non-UK settings these may sometimes be referred to as community gardens. Allotment gardens and community gardens are seen by many as a place to promote health and wellbeing in urban communities (Wiltshire & Burn, 2008).

1.6.5 Community Garden

There is no commonly accepted definition for the term ‘community garden’. For this study, the definition which will be used is that community gardens are: ‘open spaces in urban environments which are managed and operated by members of the local community in which food or flowers are cultivated’ (Patel 1991; Glover 2003; Holland 2004; Pudup 2008; Kingsley *et al.,* 2009).

1.6.6 Open Space

Open space is defined in the Town and Country Planning Act (1990) as ‘land laid out as a public garden, or used for the purposes of public recreation, or land which is a disused burial ground’. Again, the term ‘open space’ is used frequently throughout the literature in this topic.

The research field around green space and the natural environment is varied and complex, as there are so many directions that researchers can take. And the effects that have been described in studies to date very rarely stand alone. Often, they combine with various effects, which make it very difficult to isolate any one outcome for further investigation. Add in to that the numerous definitions and phrases that are used to describe research in this field, and it can start to get confusing. The main body of research, however, is undoubtedly in favour of the positive effects of the ‘great outdoors.’ It is because of this, that community gardening could potentially play a role in improving health.

1.7 Community Gardening

1.7.1 The health and wellbeing impacts of community gardening: The Lovell Model

Lovell *et al.,* (2014) described a protocol for carrying out a systematic review to explore the potential health and wellbeing outcomes from taking part in community gardening. To the best of my knowledge, the systematic review has yet to be published. In presenting the background knowledge prior to the systematic review, Lovell *et al.,* (2014) developed a model which outlined the potential;

i) Components of community gardening activities

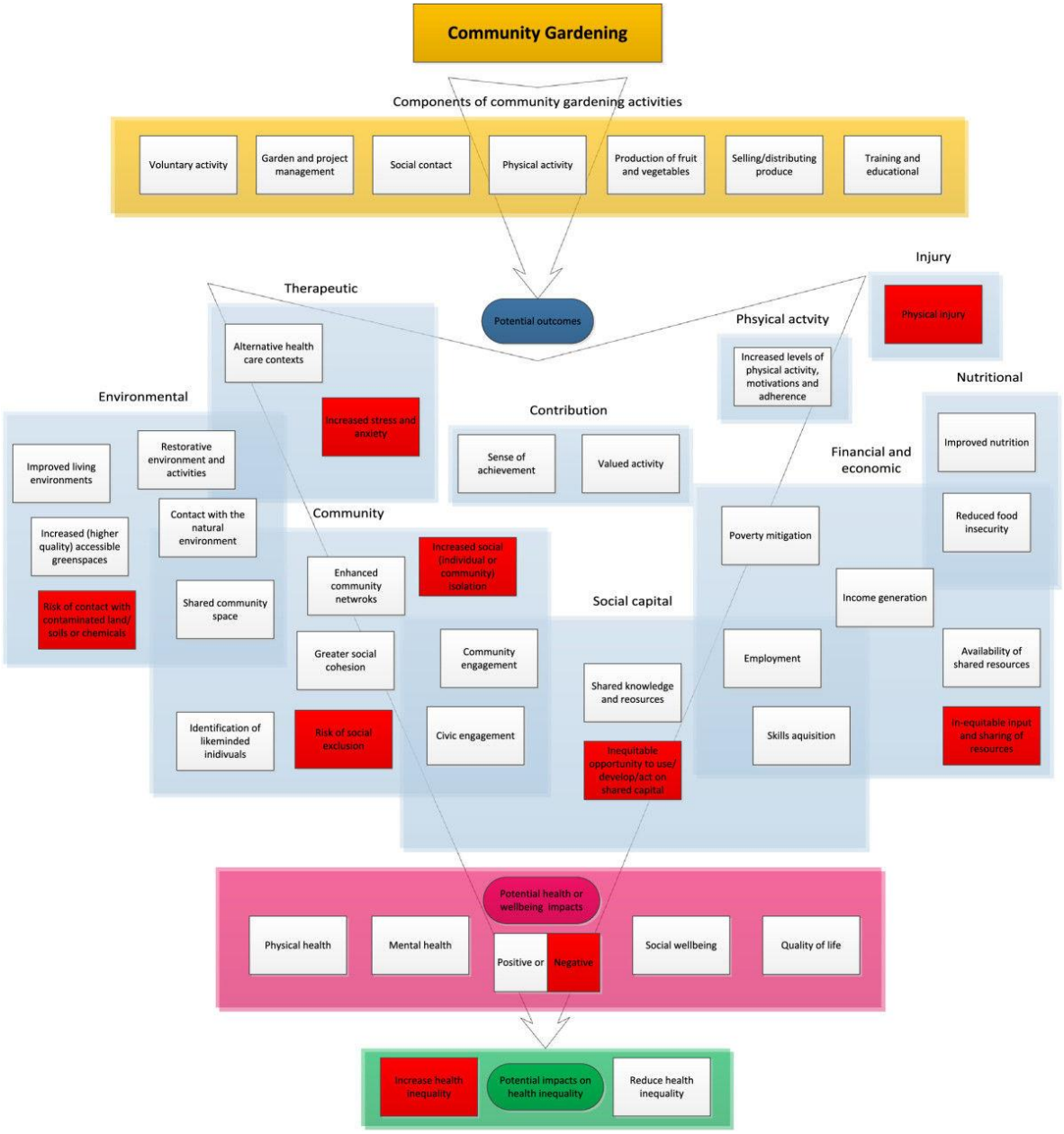
ii) Outcomes of community gardening

iii) Health and/or wellbeing impacts

iv) Impact on health inequality

The model is presented in Figure 1.7 (and is included as Appendix A), which allows a real insight into the benefits of community gardening, but also the potential negative consequences of taking part.

Figure 1.7: How community gardening may impact on health and wellbeing. From Lovell et al., (2014), page 3.

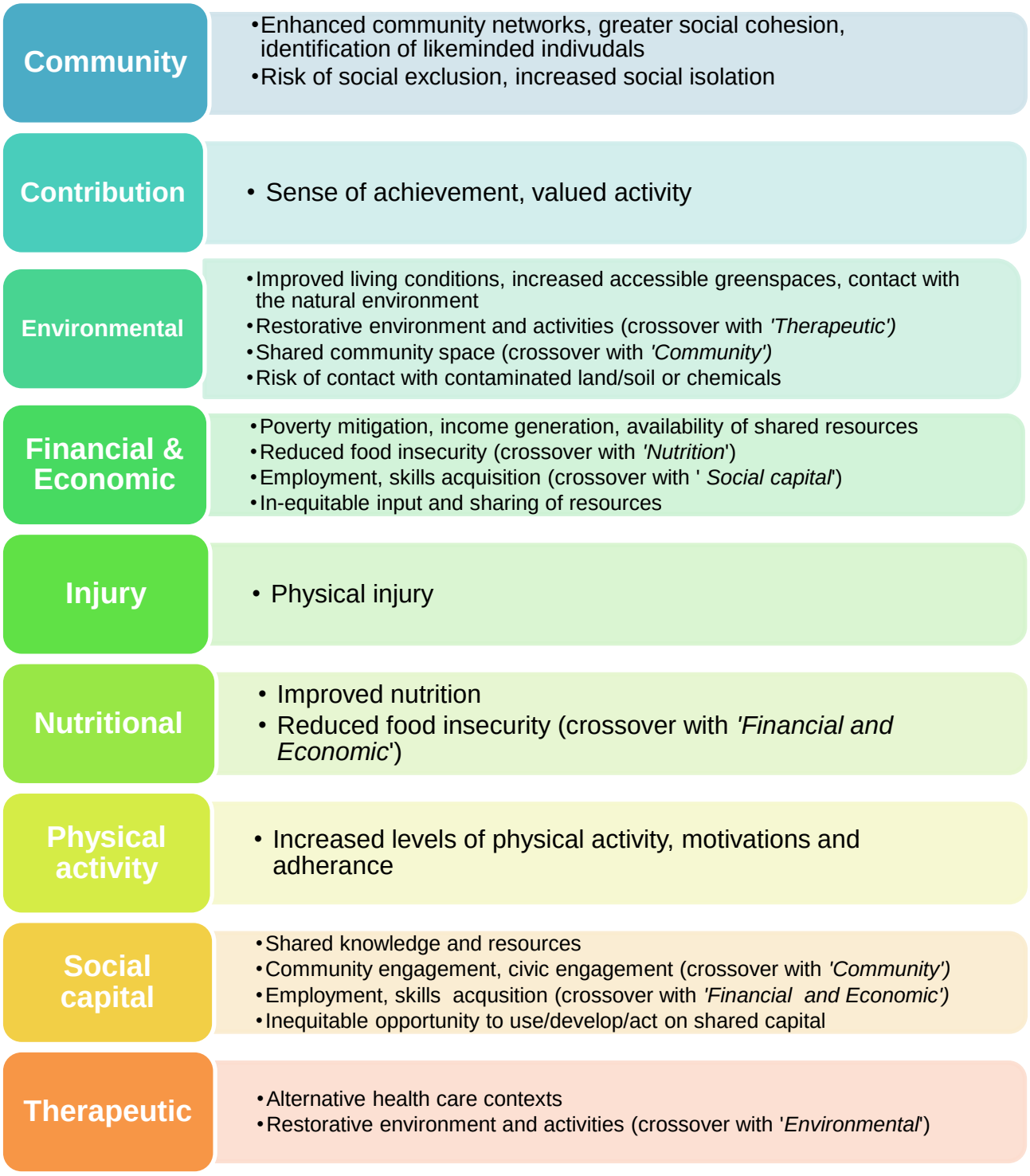


The model presented the mechanisms and the outcomes of community gardening. Figure 1.8 Show the mechanisms of community gardening, or as Lovell *et al.,* (2014) proposed, the '*Components of community gardening activities*'.

Figure 1.8 'Components of community gardening activities'. Adapted from Lovell et al., (2014)

Nine thematic areas were developed, which identified a number of potential outcomes, presented in Figure 1.9. Some outcomes crossed over between themes, and were either seen as having a positive or negative influence in the four impact domains presented in the model; physical health, mental health, social wellbeing and quality of life. Additionally, each outcome was linked with either closing or widening the health inequality gap.

Figure 1.9 Themes; the potential positive and negative outcomes; and health impacts of community gardening



There are a number of theories that align with Lovell's ideas that are outlined in Figure 1.9, and the alignment with these theories suggest that community gardening could have a much wider impact than increasing physical activity levels and improving diet and nutrition.

1.7.2 Attention Restoration Theory

There are various theories that link wellbeing with the natural environment. Lovell *et al.,* (2014) outlined a number of potential outcomes from community gardening that sit within the theme of '*Environment*'.

Attention Restoration Theory (ART) suggests that the ability to concentrate can be restored by exposure to a natural environment (Kaplan and Kaplan, 1989). Furthermore, ART has been suggested as providing a mechanism *'for natural environments to provide positive human health and well-being benefits'* (Ohly *et al.,* 2016, page 305).

Focusing on a task that requires effort is known as directed or voluntary attention (Kaplan and Kaplan 1989). This attention can become fatigued, and is associated with poorer decision making and lower levels of self-control, which have been linked to health-related issues such as obesity through neural and behavioral pathways (Fan and Jin 2013; Hare, Camerer, and Rangel 2009; Vohs *et al.,* 2008). Research suggests that urban lifestyles put a huge demand on our cognitive resources (Kaplan and Berman 2010), with ART explaining that such demands may be linked to attention fatigue (Kaplan 1995; Kaplan and Kaplan 1989). ART proposes that spending time in the natural environment will therefore reduce the demand on our cognitive resources and allow individuals to recover attentional capacities.

Kaplan (1985) suggests that ART provides four levels of benefit. ART allows individuals to:

1) "Be away" from everyday stresses,

2) Experience expansive spaces and contexts ("extent"),

3) Engage in activities that are “compatible” with our intrinsic motivations,

4) Critically experience stimuli that are “softly fascinating”

ART proposes that nature may have a significant impact on providing a restorative setting because it has an aesthetic advantage (Herzog et al. 2010; Kaplan and Berman 2010; Kaplan and Kaplan 1989). Spending time surrounded by nature allows individuals a chance for reflection and a time to contemplate unresolved issues (Herzog et al. 1997; Kaplan and Berman 2010).

1.7.3 Biophilia

Another theory that is linked to the natural environment, and would sit within Lovell’s model is the theory of Biophilia (BET). BET theorises that humans have an innate predisposition to seek connections with nature and other forms of life. Wilson (1984) defined biophilia as the *‘urge to affiliate with other forms of life’*, and that this urge has a grounding in genetics. The hypothesis is that biophilia is a fundamental, genetically based human need and propensity to affiliate with other living organisms (Kahn, 1997).

1.7.4 Seasonal Affective Disorder

Seasonal affective disorder (SAD) is a type of depression that comes and goes in a seasonal pattern (NHS, 2019). SAD is occasionally known as “winter depression” due to symptoms being more common in the winter months. Figure 1.10 highlights the symptoms of SAD, and can include:

Figure 1.10 Symptoms of Seasonal Affective Disorder. Taken from: http://www.accesshealthcareservices.com/beating-winter-blues-guide-seasonal-affective-disorder-sad/

SAD is not a fully understood as a medical condition, but the reduced levels of sunlight exposure during the winter months form the basis of the theory. The theory is that due to a lack of sunlight, the hypothalamus within the brain is unable to function effectively, and has an impact on the:

- Production of melatonin, and creates a higher volume. Melatonin is the hormone that induces sleepiness (Pandi-Perumal et al., 2007)

- Production of serotonin, which impacts on mood, appetite and sleep. Lack of sunlight means lower serotonin levels which has been linked to depression (Coppen, 1967)
- Circadian rhythm (body's internal clock). The body uses sunlight to determine when to enact important functions, such as waking up. Reduced light can unsettle the body clock (Duffy and Czeisler, 2009), and lead to SAD symptoms.

The SAD theory links in with Lovell model, as one of the components of community gardening is getting outdoors and being exposed to nature and sunlight; SAD argues that sunlight exposure can help reduce depression in those who are suffering from the disorder.

1.7.5 Self-efficacy

The Lovell model contains a number of potential outcomes that link in with a person's beliefs, behaviours and motivations, which can be related to the theory of self-efficacy (SET). Self-efficacy refers to an individual's beliefs in his or her capacity to execute behaviours necessary to produce specific performance attainments (Bandura, 1997). Self-efficacy reflects confidence in the ability to exert control over one's own motivation, behaviour and social environment.

Bandura postulated that procedures, whatever their format, can serve as a way of developing and strengthening expectations of personal effectiveness. Perceived self-efficacy affects people's choice of activities and behavioural settings, how much effort they expend and how long they will persist in the face of obstacles and aversive experiences (Bandura and Adams, 1977).

Bandura's theory says that there are four influencers of self-efficacy, seen in Figure 1.11 and there are three outcomes of high perceptions of self-efficacy: 1) persistence, 2) performance and 3) approach versus avoidance of tasks.

Figure 1.11 Bandura's Self-Efficacy Theory. Adapted from 'Understanding and Facilitating Self-Efficacy. Softskillsbuilder.com, page 1

The four influencers, or sources of self-efficacy are:

- **Performance Accomplishments** – or mastery, is the most powerful way to strengthen perceptions of self-efficacy. Successfully completing a task improves the belief that it can be successfully accomplished again.
- **Vicarious Learning** – or observational/social learning, is learning from others. This is most effective when an individual learns from someone they perceive to be similar or in a similar situation to their own.
- **Social Persuasion** – such as feedback, encouragement or other external reinforcement can positively strengthen an individual's self-confidence.
- **Emotional Arousal** – or emotional reactions, can positively or negatively have an impact on perceptions of self-efficacy. If an individual is stressed or

anxious, self-doubt and poor performance might be the result. However, if the stress/anxiety is well-managed, performance can actually improve

The four sources of self-efficacy can potentially be experienced within a community gardening intervention, which is why SET could align with Lovell's model.

1.7.6 Social Connectedness

Potential outcomes from community gardening can impact on social health, which is why the theories of '*Social Connectedness'* and '*Social Capital'* link in nicely with the Lovell model. Maslow's hierarchy of needs (Maslow, 1968) locates 'love and belonging needs' in the centre of the hierarchy pyramid, arguing the essential need of people being connected with others. John Bowlby developed attachment theory (Bowlby, 1958) within which he emphasized the need for social connections at all stages of life. Social Connectedness is another key aspect of development, and the concept emphasises the importance of relations, respect and freedom. It is the experience of belonging and relatedness between people (Van bel *et al.,* 2009).

1.7.7 Social Capital

The concept of social cohesion has been thoroughly explored in the sociology and social psychology literature with different authors providing slightly different definitions (Bruhn, 2009; Chan *et al.,* 2006). Sociologists tend to focus their analysis of social cohesion on the presence or absence of social bonds. In the public health field, social epidemiologists Ichiro Kawachi and Lisa Berkman define social cohesion as the "extent of connectedness and solidarity among groups in a society" (Kawachi and Berkman, 2000). It has been defined as a group characteristic that influences health at the individual and group levels and that is evidenced by the level of trust, reciprocity and solidarity in society (Wilkinson,

1996). Some studies have analysed social cohesion as an element of social capital and hypothesised it to be protective against disease. Putnam defined social capital as the "*features of social organizations such as trust, norms, and networks that can improve the efficiency of society facilitating coordinated actions"* (pp. 167) (Putnam *et al.,* 1994).

1.7.8 Recovery Capital

Lovell *et al.,* (2014) highlighted the potential therapeutic benefits that community gardening could offer, and provide an alternative route for health care in different contexts. Within drug and alcohol services, there is a growing interest in defining recovery and rehabilitation, highlighting the varieties of recovery experiences, and mapping the patterns, processes, and stages of long-term recovery (Betty Ford Institute Consensus Panel, 2007; White *et al.,* 2006). One of the key ideas at the core of this shift is that of recovery capital. Recovery capital (RC) is the breadth and depth of internal and external resources that can be drawn upon to initiate and sustain recovery from severe alcohol and other drug (AOD) problems (Granfield & Cloud, 1999; Cloud & Granfield, 2004). Recovery capital is conceptually linked to natural recovery, solution-focused therapy, strengths-based case management, recovery management, resilience and protective factors, and the ideas of hardiness, wellness, and global health. The concept of recovery capital reflects a shift in focus from the pathology of addiction to a focus on the internal and external assets required to initiate and sustain long-term recovery from AOD problems. This shift in focus lines up well with the basic concept of how community gardening could potentially offer to supporting those recovering from AOD problems.

1.7.9 Habit Formation

The final theory which I believe can potentially align with Lovell's model of community gardening, because of the components requiring regular completion, is Habit Formation Theory. Habits are behaviours which are performed automatically because they have been performed frequently in the past (Lally and Gardner, 2011). The repetition creates a link between the situation and the action. This means that when the situation is encountered the action is performed automatically. Automaticity has several components, one of which is lack of thought. To create a habit, behaviour needs to be repeated in the same situation. The setting where the behaviour is performed needs to be consistent so that it can cue the behaviour. In addition, the complexity of the behaviour matters. A behaviour that can be broken down into lots of components, for example, going for a run, takes longer to become autonomous than one that's made up of fewer components, such as drinking water with breakfast (Judah *et al.,* 2013). This suggests that an individual would need to invest more commitment initially for a complex behaviour, such as taking part in a community gardening intervention.

If an action happens more frequently and consistently, the sooner it will become autonomous. Research by Kaushal and Rhodes (2015) suggests it takes at least four gym sessions per week for six weeks to establish an exercise habit. That doesn't mean you can't develop an exercise habit by going less frequently; it just means it will probably take longer for it to become autonomous.

Lally and Gardner (2011) asked the question of how long it takes to form a new habit. 96 participants were asked to choose a daily behaviour to turn into a habit. Over 84 days, each participant logged in and reported whether they performed their habit, rating how automatic it felt. Participants who resolved to drink a glass of water after breakfast were up to maximum automaticity after about 20 days,

while those trying to eat a piece of fruit with lunch took at least twice as long to turn it into a habit. The exercise habit proved most tricky with '50 sit-ups after morning coffee,' still not a habit after 84 days for one participant. 'Walking for 10 minutes after breakfast,' though, was turned into a habit after 50 days for another participant. On average, it took 66 days until a habit was formed. There were differences between individuals, with one participant taking 18 days and another predicted to take up to 254 days. Not all the habits developed were as strong as one another either, suggesting that some behaviours become more autonomous than others.

1.8 The Research

The research into green space and gardening is timely as it addresses a topic that covers a range of fields such as health, urban planning, food sustainability and affordability as well as community regeneration. The 2016 Kings Fund paper on the impact of gardening on health, supports this idea (Buck, 2016). This thesis will explore a community led gardening programme in a local setting in a deprived area. The intention was to add to the limited body of knowledge on the feasibility and acceptability of a gardening programme as a mechanism for improving health. This work will also add to the growing interest in unpicking the complexity of the benefits (to whom, when and where) of gardening, thus moving away from the physical benefits of exercise and healthy eating, and towards the social and mental health constructs.

1.9 Research Aims and Objectives

1.9.1 Aim

The main aim of this research was to develop a community gardening intervention; evaluate the feasibility and acceptability of this intervention in County Durham;

obtain data to inform the sample size calculation for a definitive trial; and to add to the knowledge base by identifying the key components of successful community based interventions. Following on from 'Study One', a feasibility study was carried out that collected two distinctive types of data – quantitative and qualitative. For the purposes of this thesis, the methods and findings from the quantitative data are called 'Study Two', and the methods and findings from the qualitative data are called 'Study Three'.

1.9.2 Objectives

The research objectives were to:

Study One

- Explore the needs of local communities in terms of setting up a community gardening programme.
- To establish appropriate, feasible and acceptable data collection methods (for measuring levels of physical activity, dietary intake, anthropometric measurements and health and quality of life measurements) for the main intervention, *'Nourishing Neighbourhoods'.*
- To make any adjustments to procedural aspects of the intervention, '*Nourishing Neighbourhoods'* (Study Two and Three) to accommodate community perspectives and values.

Study Two

The two primary objectives were:

- Evaluate the recruitment and retention rates of participants enrolled and engaged in the community gardening intervention.
- Evaluate adherence to the community gardening intervention.

Secondary outcomes:

- To assess whether it was feasible to assess and measure changes in fruit and vegetable intake.
- To examine whether it was feasible to assess and measure any changes in BMI.
- To examine whether it was feasible to assess and measure any changes in physical activity levels.
- To assess whether it was feasible to measure any changes in self-reported health and quality of life.
- Exploration of the financial costs required to deliver an intervention such as '*Nourishing Neighbourhoods'*

Study Three objectives

The five primary objectives were:

- To identify positive and negative outcomes that are perceived to directly result from, or reportedly related to taking part in a community gardening programme and its evaluation.
- To identify any unintended consequences to taking part in a community gardening programme and its evaluation.
- To enhance understanding of the barriers to engaging with a community gardening programme.
- To establish practicalities required to inform, deliver and evaluate a successful community intervention in the future.

- To explore the process of completing the evaluation measures used in *'Nourishing Neighbourhoods'.*

1.10 Thesis Structure

This chapter has introduced the topic and provides a rationale for the study. The next chapter will review the existing evidence for community gardening as a credible intervention to deliver a positive impact on health. This thesis draws together findings from different phases of research, which from here onwards shall be described as Study One, Study Two and Study Three.

- *Chapter 2* is a literature review of community gardening interventions.

- *Chapter 3* provides an overview of the methodology that was reviewed, selected and justified for each of the three studies in this thesis. As I have used a mixed methods approach, there is a consideration of the particular issues around combining methods but also a justification for why this approach was felt to be most appropriate. Each research method is presented in turn, and there is also a discussion around issues of reflexivity, as well as ethical considerations.

- *Chapter 4* presents the findings from Study One; a series of focus groups exploring the needs of local community members in County Durham, and their attitudes towards engaging in a community gardening programme. The resulting data was then used as part of the intervention development process described in chapter five.

- *Chapter 5* outlines the development of the intervention, '*Nourishing Neighbourhoods'.* There is a discussion around the complexities of designing an intervention and the various methodologies that can be utilised. Then a step by step description is given on the journey taken to

develop '*Nourishing Neighbourhoods'* and the reasoning for the direction it took.

- *Chapter 6 (Study Two)* is a quantitative study of the '*Nourishing Neighbourhoods'* programme. Data were collected pre, during, and post intervention, with a view to explore the acceptability and feasibility of collecting such data.

- *Chapter 7 (Study Three)* is a qualitative study of '*Nourishing Neighbourhoods'*, with perceptions and beliefs investigated pre, during and post intervention. This data was used to triangulate with the data collected in Study Two with regards acceptability and feasibility. In addition, the qualitative findings provide rich data on the perceived health benefits that those engaged with the programme felt before, during and after the six month intervention.

- *Chapter 8* is a discussion of the overall research and the conclusion to the thesis, which includes challenges faced, strengths and weaknesses of the research and implications for policy and practice.

These eight chapters form the main body of the thesis, followed by appendices referred to throughout the thesis and references.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In this chapter, I build upon the context outlined in the previous chapter, by detailing a broad literature review which identifies the impact that the natural environment, green space and gardening has on individuals as well as communities. I then describe the scoping review carried out to determine what literature has already been published on evaluating community gardening as a health intervention for a number of different outcomes. The papers that were selected and the literature are then discussed with a view to understanding what we know and don't know about community gardening, and identifying gaps in the research field for this thesis to explore.

2.2 Background Review

2.2.1 The Natural Environment

Even though it was referred to in the Marmot Review (2010), research into the health effects of natural environments is still in its early years (Wells *et al.,* 2007; Bedimo-Rung *et al.*, 2005). However, it is starting to build up some steam. The majority of literature focuses on generic aspects relating to use of open and green space. These include the benefits green space and their use have on: physical and mental health; obesity; cardiovascular disease; anti-social behaviour; health inequalities; blood pressure; cholesterol, improved mental health and reduced stress levels; perceived better general health; and improvements in social capital and community cohesion to name but a few (Marmot, 2010; Faculty of Public Health, 2010; Natural England, 2009).

Being active outdoors has a variety of health benefits and promotes social inclusion (Barton *et al.,* 2009). Mitrione (2008) reviewed studies that showed a connection between exposure to nature and improved healing, less medication use, shorter hospital stays and a decrease in anxiety and stress.

2.2.2 Green Space

The notion of how important green space is to public health is evident in an excerpt taken from the 2010 Marmot review, 'Fair Society, Healthy Lives: Strategic Review of Health Inequalities in England post 2010.'

> *"Numerous studies point to the direct benefits of green space to both physical and mental health and wellbeing. Green spaces have been associated with a decrease in health complaints blood pressure and cholesterol, improved mental health and reduced stress levels, perceived better general health, and the ability to face problems. The presence of green space also has indirect benefits: it encourages social contact and integration, provides space for physical activity and play, improves air quality and reduces urban heat island effects." (page 88)*

There is compelling evidence of health benefits of fruit and vegetable consumption, physical activity, and outdoor interaction with 'greenspace' in urban areas (Sustainable Development Commission, 2008). Mytton *et al.,* (2012) found a positive correlation between green space and physical activity levels. More recently, Myers and Wells (2015) suggested that gardens help to reduce sedentary behaviours by providing time and space for active learning opportunities outdoors. Something that (being outdoors) has shown to be positively associated with physical activity levels (Sallis *et al.,* 2000). However, the research focussed specifically on children, which means that interpreting the results has limitations as it cannot be generalised to an adult population (Myers and Wells, 2015).

Not all research has found a positive correlation between green spaces and health outcomes. Hillsdon *et al*., (2006) found that access to urban green spaces didn't

appear to have any association with levels of physical activity in 4950 middle aged participants in Norwich. In addition, Huyunh *et al.,* (2013) studied young people in Canada, who were aged 11-16, and looked at their exposure to natural space. The link between exposure to green space and an increase in positive emotional wellbeing wasn't supported, therefore might not be a leading determinant.

A study carried out by Maas (2008) indicated that the amount of green space in a living environment was scarcely related to levels of physical activity. The associations with physical activity and green space are not as strongly supported as the associations between green space and varying measures of mental health. This is a difficult area to find a direct association due to the difficulty of measuring physical activity accurately.

In a Netherlands study, Maas *et al.,* (2009) investigated 10,089 participants and green space. It was suggested that less green space in a living environment coincided with feelings of loneliness and perceived shortage of social support. It was also argued that the percentage of green space in a living environment had a positive association with perceived general health. This provides indirect support for the positive relationship between gardening and loneliness. In addition, this research supports the notion that green space is not just a luxury- development of green space should be prioritised in spatial planning policy.

Lee *et al.,* (2011) carried out a literature review of health effects of green space. The evidence, they argued, is weak in this field. A low quality study design, failure to exclude confounding variables, bias or reverse causality and weak statistical associations are hindering the credibility of research in this field. Utilising the outdoors as a health resource that promotes physical, mental and social well-being is seemingly a cost-effective and enjoyable way to impact on the UK's

current health problems and inequalities. However, research in this field is lacking in methodological quality. This area needs addressing.

2.2.3 Gardening; Solo and Community

Norfolk (2000) suggested that the cultivation of a garden plot may offer the opportunity to “harness the healing power of nature”. The alleged health benefits of gardening gains indirect support from epidemiological studies which show a positive relationship between urban green space and health and wellbeing (Takano *et al.*, 2002; Mitchell & Popham, 2008; de Vries *et al.*, 2003; Maas *et al.*, 2006; Sugiyama *et al.*, 2008; Nielson *et al.*, 2007).

Gonzalez *et al.,* (2009) studied the relationship between gardening and depression. Measurements taken were the Beck Depression Inventory (BDI) and the Attentional Function Index (AFI). The intervention was a 12 week therapeutic horticulture programme. Analysis showed that BDI scores reduced from pre to post test and were statistically significant. In addition, the AFI increased, and was still statistically relevant at a three month follow up. This research postulated that gardening may decrease depression severity and improve perceived attentional capacity, by engaging effortless attention and interrupting rumination. Following on in 2011, Gonzalez *et al.,* looked at BDI, State Subscale of Speilberger State-Trait Anxiety Inventory, Positive Affect Scale, Perceived Stress Scale, and the Therapeutic Factors Inventory-Cohesiveness Scale. There was a significant beneficial change in all mental health variables. In addition, at the three month follow up, BMI remained consistent.

Pettigrew *et al.,* (2008) found that specific behaviours decreased loneliness, such as: friends and family as an emotional resource; eating and drinking rituals to maintain social contacts, reading and gardening. Brown *et al.,* (2004) looked at indoor gardening for older adults in a nursing home and the effects on

socialisation, activities of daily living (ADL's) and loneliness; 66 residents took part in this five week gardening project. There was significant pre and post-test differences within groups on loneliness and guidance, reassurance of worth, social integration and reliable alliance. The study also showed significant effects on three ADL's (transfer, eating and toileting). More recently, Booth *et al.,* (2018) found that community gardeners who took part in regular sessions improved their mental health compared to those who didn't regularly garden. In addition, there was also an increased sense of community, an area which Raki *et al.,* (2018) argue is a priority in racially diverse neighbourhoods where community integration is the goal.

Research published in 2010 looked at the power of community gardening to have a positive impact on rehabilitation. Lederach and Lederach (2010) carried out their research in Africa, where former child soldiers in Ghana had built a farm to grow and harvest fruit and vegetables. They used this outlet for healing and recovery, as they were still carrying the stigma of their former lives. Many people within their community still viewed these people as murderers and rapists. The youngsters found comfort in the gardening, with the start of a new life, and the hope that eventually the people in their community would see the changes that they had made and were now different (Lederach and Lederach, 2010).

In addition to this 2010 study, further work was carried out by Westlund (2015) in exploring gardening as an avenue to improve post-conflict recovery in adults, with the positive impact of gardening focussed on recovery and rehabilitation. Westlund found that the opportunity to partake in activities in a natural environment, such as gardening, had a profound effect on military veterans suffering from post-traumatic stress disorder. Themes that arose from the qualitative research included the benefits of enjoying a sensory experience; a

feeling of safety; regaining a sense of purpose, and the opportunity to renew relationships.

There has been support for various psychological and social benefits of '*Growing Your Own'* (GYO) (Milligan, 2004; Perez-Vazquez, 2005). Table 2.1 highlights the key potential health benefits from gardening and communities growing their own fruit and vegetables.

Table 2.1: Key potential health benefits of GYO in urban areas. Taken from Leaske et al., 2009. Adapted from Perez-Vazquez et al., 2005. Pages 239-266.

Physiological	**Psychological**	**Nutritional**
Multi-muscular exercise-improving cardiovascular function	Sunlight exposure-increased serotonin (less winter-depression)	Fresh produce rich in vitamins and trace elements
Load bearing- reduced osteoporosis	Sense of achievement and well-being-improved psychological health	Green leafy vegetables high in folic acid, iron and ascorbic acid
Bending and stretching- increased general muscle tone	Empowerment-independence/self sufficiency	Brassicas (cabbage, cauliflower, broccoli, brussel sprouts, curly kale) rich in glucosinolates- implicated in preventing cancers
Outdoor exercise-'fresh' air, sunshine	Nature and greenspace interaction-increased well-being	Legumes (peas, beans) are key components of the health protecting 'Mediterranean diet'
	Enhanced social networks and community interaction-increased well-being	Berry fruits rich in anthocyanins, flavonoids and vitamin C
	Sense of community and belonging-increased well-being	Apples rich in anti-oxidants implicated in cancer prevention
		Sunlight exposure-leading to increased theory vitamin D synthesis in skin

Researchers in public health have looked at the impact of gardening as a solo activity. However, perhaps gardening is at its most effective when experienced in a community setting. Arai *et al.,* (2007) investigated the association between lifestyle

activity and depression amongst men and women aged 65 and over in Japan. Less interaction with neighbours, society and friends was highly associated with depressed mood for men. The results showed that although the men were physically active with gardening/farming, the fact that they did not have close ties with friends, family, children and grandchildren meant that their mental health suffered.

McCormack *et al.,* (2010) argued that little is known about community gardening and its influence on dietary intake, beyond fruit and vegetable consumption. This review was supported by Lee *et al.,* (2011) that there are not many well designed studies in the area due to the lack of randomised controlled trials (RCTs), and also the lack of studies using valid and reliable dietary assessment tools. Litt *et al.,* (2018) have just started the process of recruiting participants for an RCT this year, which is looking at the impact of community gardening on diet and physical activity. It can be argued to advance the field of research into the benefits of community gardening, the area of nutrition is one that needs careful consideration to ensure that any research is well designed and robust.

Within a community setting, there are these potential health benefits as outlined in Table 2.1, but the situation is much more complex. Davis *et al.,* (2016) argued that most community gardening studies focus on dietary behaviours, when actually we need to look at the impact on family and the broader community, in an attempt to unpick the complexities. Davis *et al.,* (2016) carried out a review of school gardening studies that had a focus on health outcomes. The review included 13 studies, and noted a number of limitations. Three studies did not have a comparison group, and none of the studies were randomised. This was because all studies were based on timing and interest from the schools. 11 studies examined dietary intake, with six showing an increase in vegetable consumption.

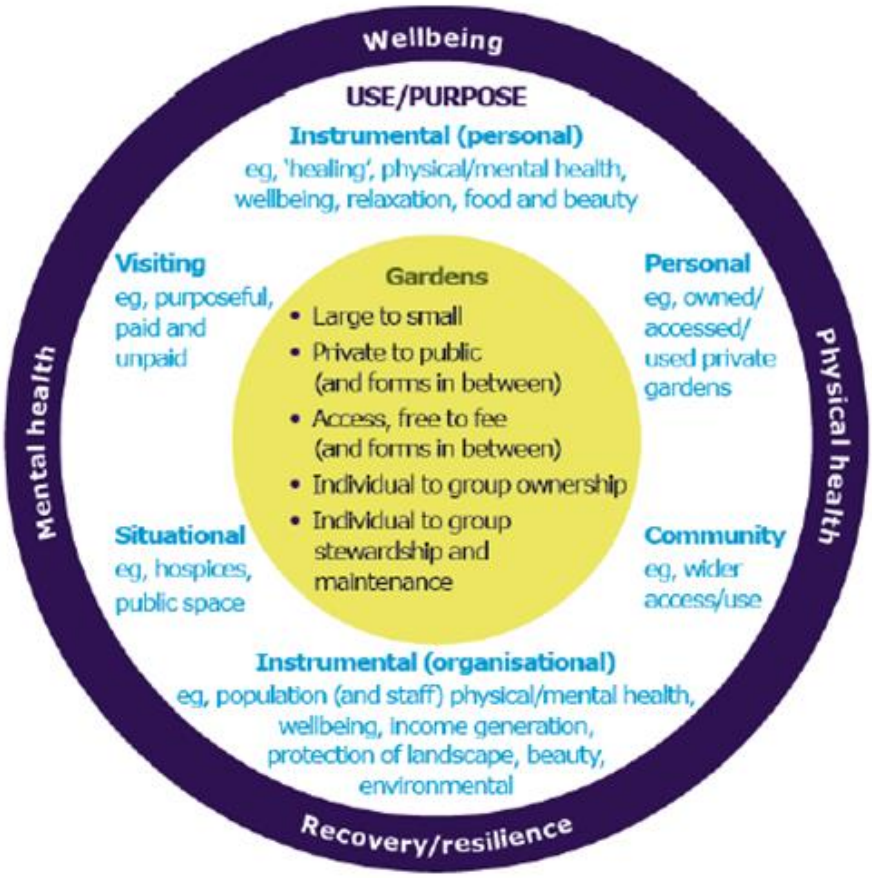
Following on from the literature review into the health effects of green space (Lee *et al.,* 2011), it is evident that researchers are facing the same limitations within gardening studies.

What has been established by this background review of the natural environment, green space and community gardening research is the sheer complexity of studying gardening and the potential impact it could have on health. This mirrors the complexity that Lovell *et al.,* (2014) highlight with the model that was presented in Chapter one.

Research over the past thirty years which has argued the notion of gardening as a tool to improve health has recently been supported by a Kings Fund paper, 'Gardens and Health' (Buck, 2016). The paper provides an overview of the literature which supports gardening as a mechanism for positive health change, with links to social prescribing, recovery, diet, physical activity, loneliness and depression (Buck, 2016). In the report, Buck (2016) demonstrated how gardening covered a plethora of benefits, ranging from mental health, physical health, general wellbeing to recovery and resilience (see Figure 2.1). It also acknowledges the shortcomings of the current evidence base and offers recommendations to drive the research field forward.

The visual depiction in Figure 2.1 of how gardening can be harnessed as a tool to impact on a variety of outcomes helps to identify the factors that require further research in this field.

Figure 2.1: What a garden is or can be. From Gardens and Health (Buck, 2016) p 13



Buck (2016) argued that gardening interventions have a place within the NHS and within local communities, and suggested the only way to ensure this aim was successful was to make it imperative that gardening is incorporated into national policy and strategic level documents to make sure that change can be implemented at a local level.

2.3 Literature Review of Community Gardening Interventions

The research that has been identified so far has, on the whole, supported the notion that being physically active in an outdoor, green environment is beneficial for an individual's physical and mental health. Furthermore, the act of gardening itself has various potential benefits that could go a long way to addressing some of the health inequalities and current health crises we currently face. In addition, the move from solo gardening to community gardening has added a new dimension to

what is already a complex field. A literature review which identifies the evidence base for previous interventions that have looked at community gardening and its effectiveness on health outcomes is required to ascertain future directions for research.

2.3.1 Search Strategy

A search strategy was devised and consisted of:

1. Search of electronic literature database (Medline);
2. Snowballing from reference lists of retrieved articles;
3. Screening of reference lists of related systematic reviews (systematic reviews of community gardening studies);
4. Examination of reference lists in key editorial and non-systematic journal articles.
5. Examination of grey literature

2.3.2 Study Inclusion and Exclusion criteria

Both quantitative and qualitative papers were eligible for inclusion. Papers were not excluded by methodology alone, and to minimise the risk of bias, research papers were not solely excluded by a participants socio-economic background or ethnicity. A limit was included however, for papers written in English.

Inclusion Criteria

Included papers had to meet the following criteria:

- Reported the implementation of a gardening intervention for short or long-term health outcomes
- Papers must be based in a community setting
- Study population that included an age range of 18+

Exclusion Criteria

- Research outside of a community setting
- Studies where interventions only targeted those under the 18 + age group
- Papers which include a study population under the target age range of 18+ years, will be excluded unless they provide a subgroup analysis of this particular age group
- Studies published pre-1990 which may limit the relevance of findings.
- Studies will not be excluded by their methodology alone- as it is anticipated that the methodology will be varied.

The Medline database was searched using the search strategy in Table 2.2 for relevant studies on 13th October 2013. The search was not limited by study design, but was limited to those written in English and were human studies. A list of 'indicator' papers were identified in the general reading of the topic area, which all hits were checked against. Originally, the search excluded a key paper in this field, Wakefield *et al.,* (2007) 'Growing Urban Health: Community gardening in South-East Toronto'. The limitation to human studies was removed and the Wakefield paper was picked up, with a total of 2148 papers to examine. In order to ensure the literature was up-to-date and relevant, an updated search was carried out on 16th November 2016 for any additional literature.

Table 2.2: Table of key words and filters for first and second literature search strategy with number of hits identified

	Search Term	Hits (13-10-2013)	Hits (16-11-2016)
1	Green exercise.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]	7	17
2	gardening.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]	1092	1506
3	allotment*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]	387	465
4	green space.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]	146	329
5	(outdoor and (physical activity or exercise)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]	771	1130
6	horticulture.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]	371	482
7	1 or 2 or 3 or 4 or 5 or 6	2731	3867
8	limit 7 to English language	2148	3438
10	limit 9 to yr="2014 -Current"	n/a	627

Once duplicate entries from the 2013 search were removed, there were 627 references to examine from the latest search. 627 references were screened for potentially relevant titles, with 511 selected. The references were then screened for appropriate abstracts, with 18 selected. This was filtered down to four additional relevant papers to look at. This process is shown in the flowchart in Figure 2.3.

After reviewing the additional literature, it was clear that although interest in investigating the impact of community gardening on health had increased, there was no evidence that contradicted the previous direction of the original literature review, and indeed supported the direction that this thesis had taken.

2.3.3 Grey Literature

Grey literature can often be used to add further depth to a literature review. Although not formally defined, grey literature is often thought to constitute material that is not published as part of a traditional academic journal, but may present findings in the form of a report or policy documents, a commentary, a blog, a doctoral thesis or as a conference proceeding (Hopewell *et al.,* 2005). By including grey literature searches in a search strategy, it seeks to minimise the potential of publication bias (Hopewell *et al.*, 2005). Grey literature searches were conducted as part of the search strategy by searching appropriate websites such as national governing bodies, local government websites and by carrying out simple Google searches with the defined key words. Any material that was found was subject to the same predefined inclusion and exclusion criteria listed above. The establishment of appropriate search terms and hence the original searches of the databases and grey literature, was completed by the end of October 2013 (Liberati *et al.,* 2009).

Figure 2.2: Flow chart of search process – 2013 and 2016

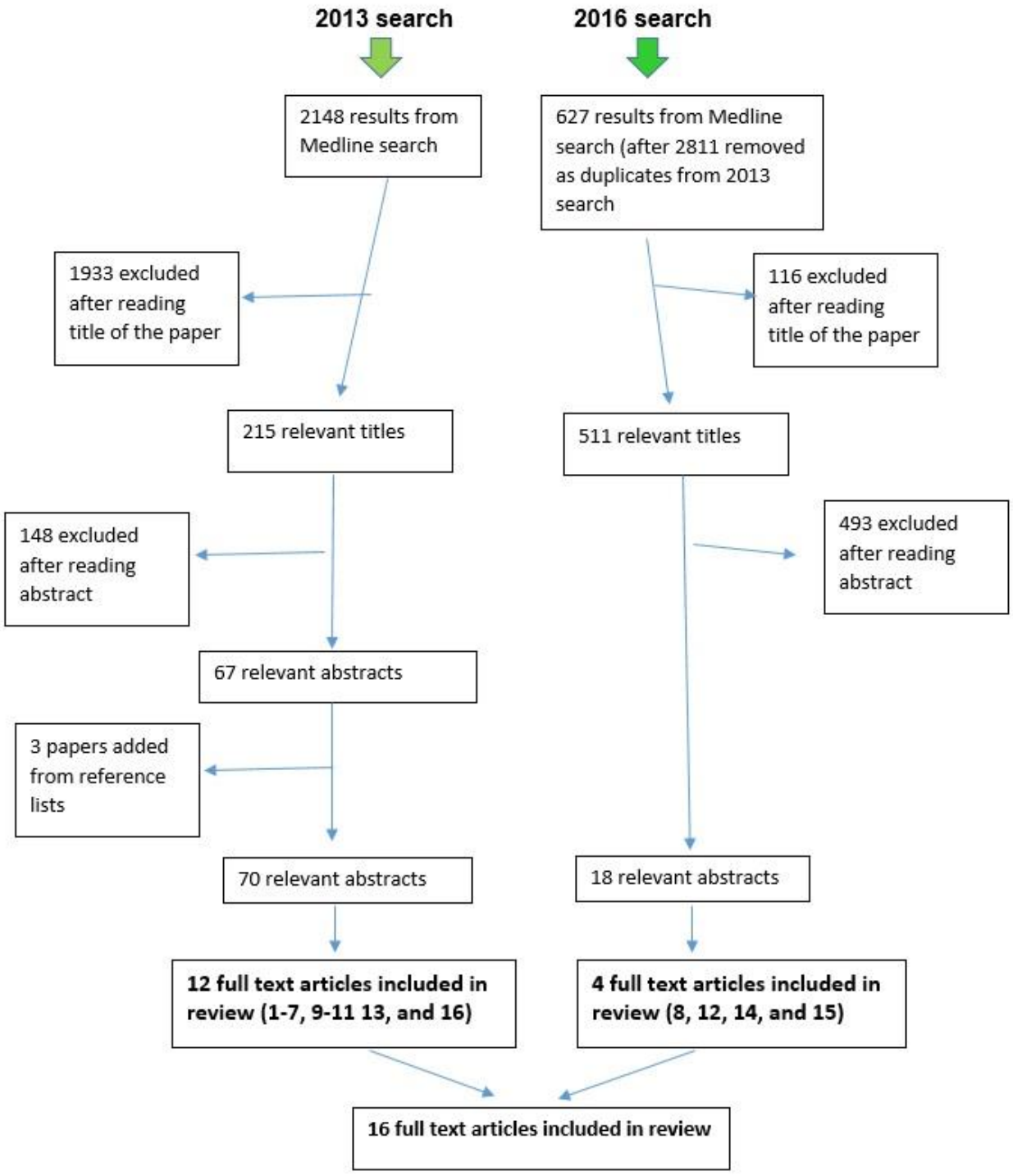


Table 2.3: Relevant studies from the literature review that focus on community gardening as a mechanism to improve health

Study	Setting	Area looking at and intervention	Study Design & Population	Instruments used	Data Analysis	Key findings	Limitations	Gaps to be addressed
1) Alaimo *et al., 2008*	U.S	Fruit and vegetable intake amongst community gardeners	Cross sectional random phone survey. 766 adults.	Behavioural Risk Factor Surveillance System questionnaire items	Generalised linear models and logistic regression models.	Gardeners consumed fruit and veg 1.4 more times per day than those who didn't garden. 3.5 more times likely to consume fruit and veg at least five times a day.	Cross-sectional and correlational, therefore no causal inference. No real gardening intervention.	No control group for comparison.
2) Armstrong 2000	U.S.	Reasons for participating in gardening. 20 gardens programmes looked at, 63 gardens in total.	Qualitative, telephone interview. 20 adults.	Interviews with co-ordinators of community garden programmes	Data analysis conducted using SA 6.02	Gardens improved social networks and community capacity, and increase access to fresh/better tasting food	Descriptive study, no controls	Control group study is essential
3) Barnidge *et al., 2013*	U.S.	Two studies investigating the association between community gardening and fruit and vegetable intake. 12 intervention gardens. 141 participants. Telephone survey for 1000 participants	postal survey (convenience sample) of community gardeners In addition, a telephone survey who lived within a 5 mile radius of a community garden	Surveys. Fruit and vegetable consumption was measured using six items from the 2009 BRFSS	Multivariate logistic regression models	Participation in a community garden was associated with higher fruit and vegetable consumption.	First survey was a post intervention evaluation. Convenience sample so possible selection bias. Cross sectional data so cannot establish causality	Highlighting the number of flaws in design and analysis. Two different sets of questions used in each survey. Selection of assessment therefore questionable

Study	Setting	Area looking at and intervention	Study Design & Population	Instruments used	Data Analysis	Key findings	Limitations	Gaps to be addressed
4) Blair, 1991	U.S.	Case control study of community gardens in Philadelphia.	144 community gardeners and 67 non-gardeners	No information	No information	Ate significantly more vegetables, less sweets and soft drinks and dairy. Average of $160 of produce grown on each plot. Reasons for involvement included recreation, mental health, exercise, produce and contact with nature. Correlation found between involvement in a community garden and 'life satisfaction.'	An earlier study into community gardening, but observational. Poor reporting of methods and analysis.	Experimental design required with robust methodology
5) Carney *et al.*, 2012	U.S.	A two year programme providing education techniques to support Hispanic farmworker families in planting and maintain organic gardens. This was done via a community meeting once a month	Pre-post test design. 42 families enrolled, 163 participants with a mean age of 44 (range: 21-78)	Developed own pre-post gardening questionnaire. Interviews, observations.	Questionnaires used descriptive statistics and Wilcoxon Signed-Ranks Test. Two coders used content analysis for qualitative data.	Frequency of vegetable intake increased in both adults and children. Qualitative analysis highlighted that community gardening as a family reduced food insecurity, improved diet and strengthened family relationships.	Design was pre-post rather than randomized, as it would have been unethical to provide some families with gardening supplies and others without	Potential to randomise the intervention, but further work required to establish the necessary ethical position to do so.

Study	Setting	Area looking at and intervention	Study Design & Population	Instruments used	Data Analysis	Key findings	Limitations	Gaps to be addressed
6) Castro *et al., 2013*	U.S.	Pilot study to evaluate Growing Healthy Kids intervention	60 families, pre/post design.	Survey to assess fruit and vegetable consumption	Pre to post programme changes	Increase in availability and consumption of fruit and veg amongst families engaged in GHK	No Control group. Not randomised	Experimental study required. Also, standardised measure of assessing fruit and vegetable intake.
7) Milligan *et al.*, 2004	UK	Empirical research examining the role of landscape and gardening in improving health	19 participants, aged between 65 and 79 in Carlisle. 9 months on an allotment with support of a full time gardener	Mixed methodology, key emphasis on ethnography, focus groups, interviews, weekly diaries	Grounded theory analysis	Community gardens combat social isolation, develops social networks	Observational, no control group	Argument for more robust quantitative research to support the qualitative evidence
8) Spears-Lanoix *et al.*, 2015	U.S.	Two gardening interventions evaluated to see impact on obesity. Intervention over a 5 month period	Pilot study. Pre/post test from 44 students and 34 parents/guardians. Process evaluation.	Survey developed using validated questions from other tools	Paired sample t tests	Statistically significant changes in pupil knowledge, vegetable preferences, vegetable consumption and home food availability. High levels of implementation fidelity. 17% of pupils moved from obese/overweight category into overweight/normal category.	No control group used, and a small sample size. Study retention rates were low (71% students, 55% parents)	The limitations have already been identified as this pilot study develops into an RCT

Study	Setting	Area looking at and intervention	Study Design & Population	Instruments used	Data Analysis	Key findings	Limitations	Gaps to be addressed
9) Teig *et al.*, 2009	U.S.	A study which examined social processes that explain the connection between gardening and health	Qualitative study in Denver. 67 respondents, 29 garden sites	Semi-structured interviews at both individual and group level	Thematic analysis	Various themes emerged that support the social and collective efficacy benefits that community gardens can deliver	Again, a study that has no control groups, and only using qualitative data	Mixed methods approach would allow a more in-depth research project
10) Twiss *et al., 2003*	U.S.	An evaluation of California Healthy Cities and Communities	An overviews of 6 community garden programs in California	Self-report surveys of physical activity levels and fruit and vegetable intake	No information	Participants increase physical activity levels and fruit and vegetable consumption. Identified key elements; local leadership, community participation and skill building opportunities for participants	This was a field action report rather than a review or robust study	More consistency required when selecting measurement tools
11) Van den berg *et al.*, 2010	The Nether-lands	Comparative survey looking at health, well-being and physical activity of gardeners v nongardeners. 12 allotment sites in the Netherlands	121 participants ,63 nongardening respondents living next door to gardeners	5 self-reported health measures, 4 well-being measures and 1 self-reported levels of physical activity. Life Satisfaction	ANOVA and ANCOVA	Gardeners reported higher levels of physical activity in the Summer than their neighbours. Gardeners 62+ scored significantly or marginally better on all measures of health and wellbeing. Under the age of 62 there was no difference	All measures self-reported so subject to bias. Observational, not experimental	Look at physical activity, but measure using accelerometers as well as self-reported. Also age of gardener is something to consider

				Index, SQUASH, SF-36				
Study	**Setting**	**Area looking at and intervention**	**Study Design & Population**	**Instruments used**	**Data Analysis**	**Key findings**	**Limitations**	**Gaps to be addressed**
12) Van den Berg *et al.*, 2011	The Nether-lands	Stress relieving effects of gardening.	Repeated measures design. 30 gardeners (8 men, 22 women), Random assignment to either outdoor gardening or indoor reading	Stroop task, with salivary cortisol levels and self-reported mood	ANOVAs with condition (reading and gardening)	Gardening and reading each led to decreases in cortisol levels and self-reported mood. Decreases were significantly stronger in the gardening group. Positive mood was restored after gardening, but deteriorated after reading	Only one control condition. Not comparing gardening with another outdoor task	Further research could look at more than one condition, and also something that is comparable to gardening, i.e. an activity outside. Physical activity levels could also be looked at
13) Wakefield *et al.*, 2007	U.S.	Perceived health impacts of community gardening	Community Based Research. 55 participants for focus groups, 13 interviewed	Participant observation, focus groups and in-depth interviews	Thematic coding	Community gardens perceived to provide health benefits such as access to food, improved nutrition, increased physical activity, improved mental health	Numbers not large enough to be generalizable	Further research that is quantitative

Study	Setting	Area looking at and intervention	Study Design & Population	Instruments used	Data Analysis	Key findings	Limitations	Gaps to be addressed
14) Whatley *et al.*, 2015	Australia	Exploring how community gardens enable occupational participation and social inclusion for those with mental health problems.	Ethnography, 13 people observed (4 staff, 5 participants, 2 external support workers, 2 volunteers). 6 people interviewed (4 staff, 2 participants)	Observations and interviews	Open coding of data	Three main themes reported; creating community by bring people together; an environment that supports participation; and a learning environment created	Role of researcher/deliverer may have created some bias in the results. Also, small sample size. Data analysis not as clear.	Improving the quality of methods reporting.
15) Wood *et al.*, 2016	UK	Investigating the impact of gardening on mental health	Pre and post design, 136 gardeners, 133 non gardeners, matched with age and gender.	measured self esteem and mood before and after an allotment gardening session,	Paired T Tests, linear regression and a one way ANCOVA	Significant difference for gardeners after the session in mood, self esteem, good health, less depression and fatigue and more vigour	Ceiling and floor effect of the questionnaires used. Difficult to engage with gardeners in poor health. Some missing data	Scope to look at further qualitative work on the mental health of the gardeners.
16) Zick *et al., 2013*	U.S.	Impact of community gardening on BMI	198 gardeners against control groups: spouse, sibling and neighbour	No instruments used as data analysed already collated	Multivariate analysis using information from publically available records	Both men and women had significantly lower BMI's than their neighbours. Lower BMI's for women community gardeners than their sisters, and men with their brothers	Only post-test. Looked at BMI, but not at changes in physical activity levels	Looking at physical activity levels

Table 2.3 gives an overview of the 16 studies included in this scoping search. The table summarises the relevant literature regarding community gardening and attempts to understand its impact on health and wellbeing. Information is included on study design, population, context, intervention information, methods, results, limitations of the research and possible gaps in the research that could potentially be addressed. It is apparent that research to date has many limitations that need to be addressed in future research. Social outcomes are the most widely addressed outcomes within community gardening research, closely followed by fruit and vegetable intake. There were only two studies which looked at physical activity levels and BMI.

A rapid review of literature was carried out in September 2017 as there was not enough time to do another full search of Medline. This was to try and stay on top of emerging data. However, no studies were identified that could be included in the review of interventions.

2.3.4 Study Characteristics

A total of 16 studies were deemed eligible for inclusion in the scoping review. Table 2.3 provides a list of included references. Of the 16 included studies, four were repeat cross-sectional studies, without a comparison control group (1-3, 10) and one with (12). One study was case control (4). One study only used a post-test design (16). Five studies were before-and-after studies (5, 6, 8, 11, 15). Five studies included qualitative research and reported on health impacts (5, 7, 9, 13, 14). Eleven of the 16 included studies based in the USA (1-6, 8-10, 13, 16), two were based in the Netherlands (11, 12), two

were based in the UK (7, 15), and one study was based in Australia (14). All papers were published in English.

The publication date range of the papers was 26 years. The earliest study was published in 1991 (4), with the most recent study being published in 2016 (9). The 16 papers utilised a range of different methods. Nine papers employed the use of quantitative methods, five papers employed the use of qualitative methods, and two papers used a combination of both qualitative and quantitative methods and were hence classified as mixed method papers. Six studies reported fruit and vegetable intake (1, 3, 5, 6, 8, 10). Four studies reported physical health measures, such as physical activity (10, 11) and BMI (8, 16). Seven studies reported on wellbeing outcomes (2, 5, 7, 9, 13, 14).

2.4 Social Outcomes

Four studies measured social outcomes, with three being qualitative research and one mixed methods. Three were conducted in the US and one was based in the UK. Armstrong (2000) carried out a survey of community gardens in the U.S., in upstate New York. Twenty community gardening programmes (which included a total of 63 gardens) were studied, with reasons for participating ranging from access to fresh foods, enjoying nature and health benefits. Gardens in low income neighbourhoods (46% of the gardens) were four times as likely as non low-income gardens to lead to other issues in the neighbourhood being addressed, such as improved infrastructure, the development of Neighbourhood Associations and additional resources such as park and playground areas. Although this study

was able to suggest many benefits that could be potentially harnessed through community gardening, the respondents to the surveys were not individual gardeners, but the garden co-ordinators. The data, with it not coming directly from the gardeners themselves, may not be an accurate reflection of the gardener's beliefs from those New York gardens. This highlights a gap in terms of the views and experiences of the gardeners.

Wakefield *et al.,* (2007) stated that although community gardens are deemed to have a number of positive health benefits, not many studies have focused solely on their health impact, and even fewer ask participants directly about their community gardening experience. Wakefield and colleagues went onto explore community gardening in Toronto via a series of focus groups, interviews and participant observations. Findings suggested that the perceived benefits of community gardening were widespread, such as improved access to food, improved nutrition, increased physical activity, improved mental health, as well as promoting social health and community cohesion.

Milligan *et al.,* (2004) argued that community gardens offer a location for social networks and activities that promote wellness, but '*also a potential route into mainstream social networks that can have an inclusive, protective and preventative function'* (p 1788).This study was carried out in the UK, in Carlisle, and focused on adults who were over 60. They found that one of the most significant elements in the garden project was the development of a peer group. Working communally, sharing knowledge, skills and increased social interaction were all seen as benefits, with individuals bringing their skills to the group. Milligan *et al.,* (2004) stated that *'communal*

gardening.....creates inclusionary spaces in which older people benefit from gardening activity in a mutually supportive environment that combats social isolation and contributes to the development of their social networks' (p 1781).

Broader social benefits for communities where the gardens are based have been proposed. These include increased community cohesion and increased social interaction across ethnic backgrounds, made possible through the creation of common purpose and activity around the community garden (Milligan *et al.,* 2004; Teig *et al.,* 2009). However, Milligan *et al.,* (2004) noted that wider social and psychological factors within community gardening were not being assessed. 14 years have passed since Milligan made these initial suggestions, and the comments are still relevant today, as community gardening and its impact on health and wellbeing are still not fully understood.

Carney *et al.,* (2012) carried out an evaluation of a two year programme providing education techniques to support Hispanic farm worker families in planting and maintaining organic gardens. 42 families were engaged in the programme, with surveys, interviews and observations utilised to collect data. The qualitative analysis highlighted that community gardening as a family reduced food insecurity, improved diet and strengthened family relationships. One of the strengths of this study was that it utilised a mixed methods approach for data collection. Quantitative data was also collected on the frequency of vegetable intake in both adults and children. Results showed that there was a significant increase in both populations. Although the mixed method approach has increased the reliability of data collected in

this study, other limitations were present. The researchers were unable to randomise the programme and which families received the intervention due to the vulnerable nature of participants. It would have been unethical to withhold well needed resources from potential participant families.

The most recent research included in this scoping review explored how community gardens were able to have an impact on occupational participation and social inclusion for those with mental health problems. Whatley *et al., (*2015) used an ethnographic approach to collect data using participant observation, interviews, and organisational documentary analysis. Three interrelated themes emerged from the findings, with the community garden providing a space for social inclusion by creating a community, creating a learning environment which helped to foster participation, as well as a flexible environment which also supported participation. This study was not without limitations, as the author described the difficulty and potential bias of being the evaluator of the study as well as being an employee engaged in the programme. This drew on similarities within this thesis, as I was involved as the deliverer but also the evaluator. Part of the critique of this paper is the insufficient data provided on the methods, and the lack of description of steps taken to overcome the potential bias at the outset. Taking this forward into my research, it is imperative that I ensure a robust and transparent report of the methods, as well as my role as the deliverer and evaluator of the research topic and intervention.

2.5 Mental Health Outcomes

Four studies measured mental health outcomes; two were conducted in the Netherlands, one was based in the UK and one in the U.S. In the study described previously, Wakefield *et al.,* (2007) carried out community participatory research, and investigated the impact of community gardening on various outcomes through interviews and focus groups. Fifty five participated in focus groups, and 13 participated in interviews. These numbers are too small to be generalisable, but is robust for qualitative research. One of the health outcomes that improved as a result of the gardening was mental health. Many examples were given of the impact, with a selected quote below:

"....sometimes when you are stressed out....when you go to the garden, you feel different. It helps you hold onto life".

Van den Berg (2010) ran a comparative study looking at health, well-being and physical activity of gardeners v nongardeners. Twelve allotment sites in the Netherlands took part in the study, with 121 participants in total. Van den Berg looked at changes in health for allotment gardeners' neighbours in comparison to gardeners, with data collected between the end of July and the beginning of September. The Life Satisfaction Index was utilised to measure loneliness. The study also collated background variables to analyse socio-demographic characteristics (age, gender, education level, occupation, ethnicity, household income, marital status and having school age children). Gardeners rated the stress relief that gardening provided as the most important benefit. In another study in 2010, Van den Berg (2011) provided

some initial results showing that allotment gardening reduced stress levels, with gardeners' elevated salivary cortisol levels decreasing by 22% versus a control group who read indoors (11% reduction).

Wood *et al.,* (2016) carried out a case-control study of the health and well-being benefits of gardening in the North West of England. 269 participants from 10 sites took part in the research, where measurements for self-esteem, mood and general health were taken. Data was collected pre and post intervention, which was one gardening session. 136 gardeners had data collected, which was then compared to data collected from 133 non gardeners. The results were overwhelmingly in favour for the gardeners cohort, with an increase in self-esteem, mood, general health, reduced depression, reduced fatigue and more vigour. This research highlights the potential that gardening can have on a number of outcomes, and is one of only a few that has attempted to design a study with a control group. However, the data collected was based on just one gardening session. These findings cannot be viewed as evidence for the long term impact of community gardening on health. Future research in this field requires study designs that can collect and analyse data over a much longer time period.

In spite of the recent research by Wood *et al.,* (2015), there are a few areas within the realms of community gardening research that have received less attention, such as self-esteem, confidence and anxiety. By identifying this gap, the argument to pursue these areas in any research of a future intervention must be considered.

2.6 Fruit and Vegetable Intake

Six studies measured fruit and vegetable intake and all were based in the U.S. The literature review supports the suggestion that a high proportion of the research so far into community garden interventions has focussed on dietary intake. Evidence suggests that community gardening increases levels of fruit and vegetable intake (Barnidge *et al.,* 2013; Alaimo *et al.*, 2008; Blair, 1991; Carney *et al.,* 2012 and Twiss *et al.,* 2003).

A study undertaken by Castro *et al.,* (2013) looked at the Growing Healthy Kids (GHK) programme. A weekly gardening session was delivered in addition to a seven-week cooking and nutrition workshop. Ninety-five children aged between two and 15 years took part. Following on from the intervention, 17 % improved their BMI classification. 36 children had a BMI classification of either obese or overweight at the time they joined the programme. Out of the 23 children who had a classification of obese at the start of the programme, three moved into the overweight category by the end of the programme. Out of the 13 children classified as overweight prior to the programme, three moved into the normal BMI classification post-programme. All participants who were already classed as having a healthy BMI were able to maintain this classification. Parental reports showed a 146 % increase in availability of fruit and vegetables, with an increase of 28 % for fruit consumption and 33 % for vegetable consumption. However, this study wasn't randomised and there were no control groups, therefore the observed effects may have been due to some external or underlying factor other than the intervention.

One study that had identified a significant gap in the literature in 2015 was the work of Spears-Lanoix *et al.,* (2015), who conducted a five-year study with an RCT design. The research was a pilot study which took place in 2012, in preparation for the main trial, which is ongoing at the time of writing. To the best of my knowledge, there has been no RCT carried out in the field of community gardening prior to 2015. The paper reported results from the pilot intervention which was testing two of the interventions for the Texas! Go! Eat! Grow! trial (Spears-Lanoix *et al.,* 2015). The two interventions were the Junior Master Gardner (JMG) and Walk Across Texas (WAT) programmes, which both aimed at targeting childhood obesity among third-grade students in schools in the USA. JMG is a youth horticulture classroom curriculum used to teach students about plant needs and people needs, including health and nutrition concepts. WAT is a programme designed to establish regular physical activity as a lifetime habit in students. The study was evaluating a child obesity prevention model, with the intention to improve healthy eating and physical activity behaviours of children and their families. The study also looked at implementation data. The researchers found a statistically significant change in knowledge of fruit and vegetables, vegetable preferences, vegetable consumption and home food availability amongst intervention participants (both children and their parents).

2.7 Body Mass Index

Two studies measured Body Mass Index (BMI), and both were based in the U.S. The studies examined the impact that community gardening had on BMI (Castro *et al.,* 2013; Zick *et al.,* 2013). The study by Zick *et al.,* (2013) examined the BMI of 198 community gardeners against control groups: the

participant's spouse, sibling and their neighbour. Both men and women had significantly lower BMIs than their neighbours following participation for at least one year in a community garden plot. Women had an average BMI that was 1.48 lower than their neighbours, whilst the men had a BMI that was on average, 2.52 lower than their neighbours. It was reported that there was a lower BMI for women community gardeners than their sisters, and men than their brothers. There was no statistically significant difference between the BMI of gardeners and their spouses. Only BMI was looked at in this study, so future research could investigate physical activity levels as well as BMI.

Spears-Lanoix *et al.,* (2015) also found positive changes in children's weight. At baseline, the weight status categories were: 57 % obese, 10 % overweight and 31 % healthy weight. Post intervention, the categories had shifted positively to 39 % obese, 16% overweight and 45 % in the healthy category. High levels of implementation fidelity were also found through qualitative research with the teachers involved in the intervention. This study has shown that there is room for RCTs in the field of community gardening research, which allowed the pilot study to develop into a main trial. Results from this trial are still pending. Although the pilot study was able to highlight some potential positive outcomes, the researchers were realistic in their discussion, acknowledging that there was no control group in the pilot. However, this is the norm for feasibility research. Other limitations included some difficulties understanding surveys and consent forms, which were subsequently changed for the main trial.

2.8 Physical Activity Levels

Two studies (Van den Berg, 2010 and Twiss *et al.,* 2003) measured physical activity levels; one based in the Netherlands and one based in the U.S. It is apparent that research investigating the effect of community gardening on physical activity is scarce. Twiss *et al.,* (2003) reported that participants increased their levels of physical activity if engaged with a community gardening programme. In the Van den Berg (2010) study, gardeners reported higher levels of physical activity in the Summer than their neighbours. A critique of the research design shows that these studies were either lacking in control groups or relied on self-report measures, which are susceptible to bias. In addition, these studies took place in the USA and the Netherlands, which in turn makes it more difficult to generalise the results to the UK. However, the lack of previous research in this area suggests that physical activity could be assessed in this thesis.

2.9 Limitations

2.9.1 Limitations of the Scoping Review

Although this scoping review aimed to adopt a systematic approach to literature searching, it is not always possible to capture all of the relevant literature. Although three searches were carried out throughout the duration of the thesis, there is no certainty that all papers have been included and any recent additions to the literature may have been missed. One limitation was that there was no framework used to appraise the papers. In a full systematic review, it is imperative that a critical appraisal of the internal validity of the review, but also for reporting 'high quality' evidence (Carroll *et al.,* 2012). Dixon-Woods *et al.,* (2004) argued that the criteria for assessing qualitative

research must be different to the criteria used for assessing quantitative research, due to issues such as transparency around reporting methods, the methodology used and the analysis of the data. The Critical Appraisal Skills Programme (CASP 2017), a tool which uses 10 questions to help provide guidance on exclusion (Campbell *et al.,* 2003), could have been utilised to increase the validity and reporting quality of this scoping review.

Another limitation was that as there were a limited number of papers that had taken place in a UK setting, there were no restrictions placed on the location of the paper for inclusion. This therefore may limit the applicability of papers to the UK community gardening setting. However, as there were some UK papers, and the papers from the U.S, Australia, Japan and the Netherlands were useful at identifying potential health outcomes linked to community gardening, it is expected that this will not have too much of a negative impact on the applicability of the scoping review.

2.9.2: Limitations in Previous Research

A reoccurring issue with research that investigates the impact of community gardening on health is that the evidence provides more insight into the views and experiences of community gardening schemes than we do about the health and wellbeing impacts. Although a few studies focus on health impacts, this research is mainly qualitative. In addition, it is clear from my critique so far that the designs utilised in previous studies have been of a poor standard, or have been insufficiently reported in papers to be able to provide a critique of them. This is supported by Lee *et al.,* (2011). An obvious gap within the literature is the lack of studies that have control groups;

therefore it is difficult to evaluate whether a comparable group who does not garden would experience the same effects. Although the updated literature review included some promising pilot research by Spears Lanoix *et al.,* (2015), the RCT results have not been published yet.

Based on this scoping review of the literature, identifications of significant gaps in research that looks at physical activity were noted. There were no studies that measured moderate-to-vigourous physical activity (MVPA) of community gardeners. Zick *et al.,* (2013) looked at BMI, but did not measure physical activity levels. The majority of the studies that had comparators looked at fruit and vegetable intake. On the whole, this research field is lacking not only in numbers, with only 16 papers identified, but also in robust quantitative studies and qualitative studies, which supports the need for further mixed methods research in this field.

Although there are currently only a few robust studies, the research field has grown considerably over the last five to ten years. The recent evidence supports the idea that community gardening could have a positive impact on a wide range of health outcomes. As Twiss *et al*., (2003) stated, '*The community garden is exceptional in its ability to address an array of public health and liveability issues across the lifespan.'* (page 1). In addition, Lanier *et al.,* (2015) argued that community gardens build and nurture community capacity. Mayer defined this as *'the combined influence of a community's commitment, resources, and skills that can be deployed to build on community strengths and address community problems'* (2008, page 2).

2.10 What we know and don't know from the literature and scoping review

To help identify what the literature and scoping review was providing evidence of, and to highlight what was still unknown, i.e. the rationale for the thesis, I have synthesised the literature into six tables. Tables 2.4 through to 2.9 describe the literature in relation to physical activity (Table 2.4), BMI (Table 2.5), nutrition (Table 2.6), community interventions (Table 2.7), mental health (Table 2.8) and social health (Table 2.9). Each table outlines:

(i) What is known,

(ii) What gardening mechanisms were used- if any,

(iii) What is unknown, and

(iv) If the literature is linked to any of the theories described in chapter one as having the potential to link with Lovell *et al.,* (2014) community gardening model.

Table 2.4 What the literature and scoping review tells us about physical activity outcomes from community gardening

What we know	**Was the intervention described?**	**What we don't know**	**Link to theories**
Leaske *et al.,* (2009) Improvement in cardiovascular function, reduction in osteoporosis.	Yes; gardening	No description of what the gardening programme entailed	No link to theories described in this thesis
Twiss *et al.,* (2003) increase in physical activity levels.	Yes, the name of a gardening programme; Healthy Cities and Communities programme	PA was self-reported, also more of a field action report. Not a robust study. Measurement tools? Description?	No link to theories described in this thesis
Van den berg *et al.,* (2010) gardeners had higher levels of PA in summer compared to their non-gardening neighbours.	No	PA self-reported again. No description of the intervention	No link to theories described in this thesis
Wakefield *et al.,* (2007) Improved physical activity levels.	No	Only qualitative and no self-report tools used. No description of the intervention	No link to theories described in this thesis
Wood *et al.,* (2016) gardeners had less fatigue and more vigour	Yes; one gardening session	Only one session, so don't know long term impact. Also, was in an allotment, not a community setting	SAD

The literature is suggesting that gardening improves physical activity levels, however, the details of what the gardening programmes look like are omitted.

Table 2.5 What the literature and scoping review tells us about BMI outcomes from community gardening

What we know	**Was the mechanism used described?**	**What we don't know**	**Link to theories**
Gonzalez *et al*., (2011) BMI stayed the same.	Yes; a 12 week therapeutic horticulture programme	N/a	No link to theories described in this thesis
Spears-Lanoix *et al.,* (2015) 17 % of pupils moved from obese/overweight to overweight/normal category.	Yes; a 5 month gardening intervention	No control group	No link to theories described in this thesis
Zick *et al.,* (2013) Gardeners had lower BMIs than their neighbours, lower for women than their sisters and men with their brothers.	No	Only post-test measurement of BMI. We don't know the pre-post test result. Also, no PA measurement	No link to theories described in this thesis

The literature surrounding BMI is less conclusive, with some findings supporting the idea that gardening can help to reduce BMI, and others, such as Gonzalez *et al.,* (2011) suggesting that BMI is unlikely to change through the mechanism of gardening.

Table 2.6 What the literature and scoping review tells us about nutrition outcomes from community gardening

What we know	Was the mechanism used described?	What we don't know	Link to theories
Leaske *et al.,* (2009) Increase in access to fresh fruit and vegetables, and sunlight exposure increasing from Vitamin D synthesis in skin.	No, as covered a systematic review	N/a	SAD
Mccormack *et al.,* (2010), Lee *et al.,* (2011).	No	We don't know the influence of community gardening on dietary intake other than fruit and veg, due to lack of RCT's and reliable assessment tools	No link to theories described in this thesis
Davis *et al.,* (2016) The systematic review of school gardening programmes showed 6 out of 11 studies found increased vegetable consumption.	No	Hard to carry out RCTs as studies are based on interest from schools.	No link to theories described in this thesis
Alaimo *et al.,* (2008) Fruit and vegetable consumption increased.	No	With Alaimo *et al.,* (2008), no gardening intervention, therefore no causal inference. No description of the intervention.	No link to theories described in this thesis
Armstrong (2000) Increase in access to fresh produce.	No	No description of the intervention.	Biophilia
Barnidge *et al.,* (2013) Increase in fruit and vegetable consumption.	No	No description of the intervention.	No link to theories described in this thesis
Blair (1991) community gardeners ate more vegetables, and less soft drinks, sweet and dairy produce.	No	With Blair (1991), first survey was a post intervention survey, and the second was a different survey- we need to have pre and post. No description of the intervention.	No link to theories described in this thesis

What we know	Was the mechanism used described?	What we don't know	Link to theories
Carney *et al.,* (2012) vegetable intake increased in adults and children, and reduction in food insecurity.	Yes; in a two year educational programme (monthly sessions)	The methods of the community gardening programme were not well reported, therefore we need better reporting of what the CG intervention is	No link to theories described in this thesis
Castro *et al.,* (2013) increase in availability and consumption of fruit and vegetables in families.	Yes, the Growing Healthy Kids intervention	There were no standardised measure of assessing fruit and vegetable intake	No link to theories described in this thesis
Spears-Lanoix *et al.,* (2015) increase in vegetable consumption and home food availability.	Yes; in a 5 month gardening intervention	No control groups	No link to theories described in this thesis
Twiss *et al.,* (2003) increase in fruit and vegetable consumption.	Yes: the Healthy Cities and Communities programme	N/a	No link to theories described in this thesis
Wakefield *et al*., (2007) Improved access to food and nutrition.	No	No quantitative data collection, and no description of the gardening intervention	No link to theories described in this thesis

A high percentage of the literature and studies exploring the impact of gardening on nutritional outcomes, such as an increase in access and consumption of fruit and vegetables highlighted again that there was poor reporting of any gardening programmes or interventions delivered. In addition, what has been found to be lacking is using quality reporting tools to measure any nutritional outcome, and ensuring that data is collected pre and post intervention.

Table 2.7 What the literature and scoping review tells us about community outcomes from community gardening

What we know	**Was the mechanism used described?**	**What we don't know**	**Link to theories**
Twiss *et al.,* (2003) identified key elements of a community based gardening intervention - local leadership, community participation and skill building opportunities.	Yes; a Healthy Cities and Communities programme.	This is a one off study exploring key elements of community gardening interventions, and so further exploration is required.	Social capital, self-efficacy

There was a lack in the quantity of literature that explored the key components of a community based health intervention withi the field of gardening. To the best of my knowledge, only Twiss *et al.,* (2003) highlighted the impact of the community focus within gardening, and what elements of a community based intervention, gardening or nongardening, were key to success.

Table 2.8 What the literature and scoping review tells us about mental health outcomes from community gardening

What we know	**Was the mechanism used described?**	**What we don't know**	**Link to theories**
Gonzalez *et al.,* (2009) depression levels reduced	Yes; a 12 week therapeutic horticulture programme.	N/a	SAD
Gonzalez *et al.,* (2011) reduction in anxiety and stress	Yes; a gardening programme.	N/a	Self-efficacy
Booth *et al.,* (2018) improved mental health	Yes; a gardening programme	N/a	Recovery capital
Westlund (2015) positive impact on those suffering from PTSD- enjoyment from sensory experience, sense of purpose, renewing relationships	Yes; a gardening programme	How long gardening?	Self-efficacy, social connectedness, recovery capital
Leaske *et al.,* (2009) Increased serotonin from sunlight exposure, and reduction in 'winter depression', sense of achievement and wellbeing, empowerment: independence and self-sufficiency, exposure to nature improving wellbeing, enhanced social networks, sense of community	No, as a systematic review	No description of the intervention.	SAD, self-efficacy, biophilia, social capital, social connectedness
Armstrong (2000) Improved social networks and community capacity	No	No description of the intervention.	social capital, social connectedness
Van den berg *et al.,* (2011) a higher reduction in stress levels (through a decrease in cortisol and self-reported mood) for gardeners.	Yes; an outdoor gardening intervention v an indoor reading intervention.	Not comparing gardening with another outdoor task, so difficult to compare	SAD

What we know	Was the mechanism used described?	What we don't know	Link to theories
Wakefield *et al.,* (2007) improved mental health	No	No description of the mechanism	Recovery capital
Wood *et al.,* (2016) gardeners improved mood, self-esteem, reduced depression.	Yes; one gardening session	Only one session, so need to know if longer term impact. Also, was an allotment. What about in a community setting?	Self-efficacy

The literature discusses a variety of mental health outcomes that have improved from gardening, from depression, anxiety and stress, through to increases in self-esteem and developing a sense of purpose. Within the study details, there are better descriptions of interventions within mental health, but they are still not robust or consistent enough to be able to replicate any of the interventions.

Table 2.9 *What the literature and scoping review tells us about social health outcomes from community gardening*

What we know	Was the mechanism used described?	What we don't know	Link to theories
Pettigrew *et al.,* (2008) reduced loneliness.	Yes; gardening.	Poor description of the intervention used.	Social connectedness
Brown *et al.,* (2004) reduced loneliness, social integration.	Yes; in a 5 week indoor gardening project.	Poor description of the intervention used.	Social capital, social connectedness
Booth *et al.,* (2018) increased sense of community from gardening.	No	No description of the intervention used.	Social connectedness

What we know	Was the mechanism used described?	What we don't know	Link to theories
Lederach and Lederach (2010) opportunity for healing and improving fractured relationships.	Yes; a community gardening farm built for harvesting fruit and vegetables.	Poor description with not enough detail.	Recovery capital, social connectedness
Carney *et al.,* (2012) gardening strengthened family relationships.	No	No description of the intervention used.	Social connectedness
Milligan *et al.,* (2004) gardening created a reduction in social isolation and helped develop social networks.	No	Only qualitative data with Milligan *et al.,* (2004). Quant data in social outcomes would strengthen findings. No description of the intervention.	Social capital, social connectedness
Teig *et al.,* (2009) support for the social and collective efficacy benefits of gardening.	No	Only qualitative data and no control groups. No description of the intervention.	Social capital, social connectedness, self-efficacy
Whatley *et al.,* (2015) gardening created community cohesion and a learning environment.	No	Poor recording of how data was analysed. No description of the intervention.	ART, social capital and social connectedness

As with mental health, there is also a growing body of evidence that supports the argument that community gardening can have a positive impact on social health, such as reducing loneliness and social isolation and increasing the sense of community. The strength of these findings would be increased if mixed methods was a more prominent data collection method. Again, the lack of intervention descriptions make it extremely difficult to understand what is was about each study intervention that was key to the positive health outcome observed.

Tables 2.4 to 2.9 highlight that there are areas within community gardening which we are still unsure of are:

- Standardised measurements are not being used for measuring fruit and vegetable consumption and physical activity (pre and post)
- How the evidence would present itself if studies were able to have a control group
- There is poor reporting of what any gardening intervention actually was across the literature and scoping review
- Poor reporting means that we don't always know whether some findings come from solo gardening or community gardening
- There are numerous studies exploring fruit and vegetable intake, but not as many focusing on social and mental health outcomes
- There were only two studies in the scoping review which were carried out in the UK, so it is not always feasible or appropriate to generalise findings
- Only one study, Twiss *et al.,* (2003) identified key elements for the intervention itself, with one being community participation

Tables 2.4 to 2.9 provides some rationale for the direction of how the research developed:

- Further research is needed to add to the knowledge base in the UK about the impact of gardening, but also a community intervention
- Although a number of studies looking at fruit and vegetable consumption and physical activity, this research should ensure that validated, standardised, pre and post measurement tools are used. It may also be useful to get feedback from participants about the measurement tools used
- Although this research will not be an RCT, and therefore no control groups, a community gardening intervention could be delivered across a number of sites, which may provide richer data
- There are so many social and mental health outcomes to possibly look at quantitatively. But until we can ensure there is an intervention in place that is feasible, the best way to explore that data at first is qualitatively, and then this research can recommend what are the

stronger themes emerging, and future research could explore the quantitative collection of such outcomes

- Further exploration is needed of the 'community' element of the intervention

2.11 Summary of the Evidence Base

The studies that have focused on gardening have tended towards qualitative research, and have documented the health and social benefits perceived by garden participants which include: healthier eating (because of the access to fresh fruit and vegetables); improved mental health (because of increased mental activity and increased social interaction); increased physical activity levels; and connecting to the natural environment (Milligan *et al.,* 2004; Teig *et al.,* 2009). In addition, broader social benefits for communities where the gardens are based have been proposed. These include increased community cohesion and increased social interaction across ethnic backgrounds, made possible through the creation of common purpose and activity around the community garden (Milligan *et al.,* 2004; Teig *et al.,* 2009).

In terms of quantitative studies investigating the potential health benefits of community gardens, these are few and far between, with the majority being cross-sectional and pre/post design studies conducted in the USA and the Netherlands. These studies indicate that allotment gardening (community and private) is positively associated with healthy eating, in both participants and their family members and general wellbeing in participants. A number of before and after evaluations and one controlled trial, all in the USA, indicate positive effects of school gardens on fruit and vegetable knowledge and

consumption amongst children aged up to 11 years. However, evidence to suggest the same positive effect for those over the age of 11 is lacking.

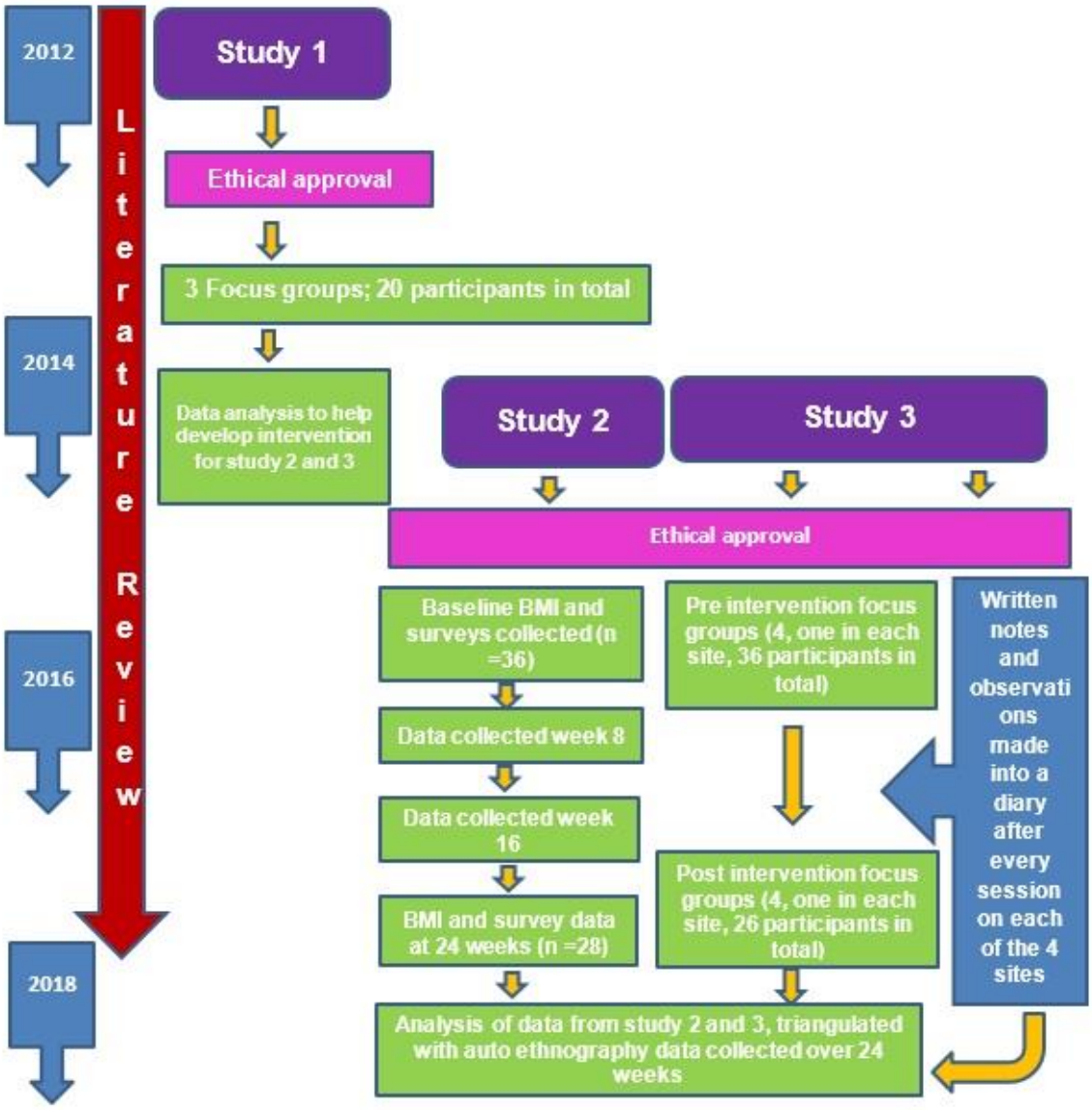
There is an urgent need for theoretically informed, sustainable ways of engaging with nature to promote human and environmental health (Hansen-Ketchum *et al.,* 2009). This research is needed to improve our understanding of the interaction of social and physical environments and community health, effective strategies for empowerment, development and health promotion. Any study examining the impact of community gardens and allotments should consider how to measure the broader effects on health and wellbeing in the communities in which the gardens are situated. In-depth research is needed which can examine the effectiveness of community gardens to act as a mechanism for improving physical activity, healthy eating and mental health and wellbeing amongst participants in the UK.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

The previous chapters have provided a rationale and context for the research into community gardening and its impact on physical and mental wellbeing. This chapter will describe the research approach, design, data sources, ethical procedures, and the analytical approach utilised. Techniques and consideration of methods will be explained, including justification as to why these methods were chosen. My PhD began in October 2010 with Study One taking place 18 months later. This study was undertaken prior to the main intervention to help inform the development of a community gardening programme. Following on from this, the development of the intervention '*Nourishing Neighbourhoods'* took place, followed by gaining ethical approval to deliver Study Two and Three. Study Two and Three began in July 2015 and finished in January 2016. The timeline of events can be seen in Figure 3.1. Specific detail for each study, including data collection procedures, is described within chapter four (Study One), six (Study Two) and seven (Study Three).

Figure 3.1: A visual representation of the research timeline



The first stage of the research was to conduct a scoping literature review using systematic searches of one database, Medline, conducted at two time points. This was supplemented with ad hoc searches of other sources such as google scholar and a grey literature search. Reviewing the literature is an established secondary research method that often proves a solid foundation on which to build a research project (Anderson and Poole, 2009). Literature

reviews can produce an overview of how a topic has been constructed within the academic field, theories of the importance to the current body of knowledge, and highlight any gaps in knowledge. A literature review is useful as a stand-alone project but also informs primary research in devising drafts of items such as topic guides and the interpretation of research findings in the context of previous literature.

3.2 Research Approach

This thesis has evolved during the seven years that I have been working on it. Something which only became apparent towards the end stages was the actual research approach. My approach evolved over time. What started off as a feasibility study with a very structured protocol turned into a pragmatic action research project, as I learned more about different research designs. The local communities I was working with had had an active part in developing the intervention that was delivered in Study Two and Three, and it was only after completing a training course in Participatory Action Research (PAR) that I understood this was a valid research approach. Not only that, but listening to the community voices throughout the six month delivery period meant that the intervention was constantly being reshaped and revised, depending on what community I was working in. So although this section within the chapter was not used as a framework to begin with, I can reflect on its use post intervention, and I feel that it is important to set it out early in the thesis.

3.2.1 Mixed Methods Approach

An exploratory research design using mixed methods (Creswell, 2014) was used in this thesis. When choosing the research design, the possibility of a limited sample size was a critical consideration. Possible designs were looked at, such as a randomised design. This was not possible due to the complexities of finding locations and communities who were willing to engage with the intervention. A stepped wedge design was also considered, but this was going to be logistically very challenging due to issues such as gaining consent for land use, ensuring permissions were in place to run an intervention, and not enough interest to take a site forward. It was eventually decided that a rolling cohort study approach would be used. This was due to the flexibility it gave me as a researcher to start on each site when it was accessible.

I felt that a mixed methods approach would be the most appropriate approach, as this would give a blend of quantitative and qualitative research methods that I felt could best answer the questions that had arisen from the literature review. The surveys would be able to provide data on self-reported health outcomes, but with the sample size being small, the qualitative focus groups would provide me with the opportunity to unpick what the perceived impact on health outcomes was for participants engaged in '*Nourishing Neighbourhoods'*, as well as learn about the process and participant experience. Diary entries from an auto-ethnographic approach allowed for me to observe the intervention and the interactions of the participants to help triangulate the full data set. In some studies, the mixed method approach has led to conflicting data (Moffatt *et al.,* 2006), but these discrepancies can allow

the researcher to interrogate the dataset more fully. This increases study robustness, and may lead the researcher to draw a different conclusion to one that may have come from only one data collection method. This showcases the strength of collecting both qualitative and quantitative data together, and is more likely to lead to a stronger evidence base (Moffatt *et al.,* 2006).

There are different ways of undertaking mixed methods research, and Creswell (2014) suggests three general strategies: convergent parallel mixed methods: in which quantitative and qualitative methods are undertaken at roughly the same time and aim to provide a comprehensive analysis of the research problem; explanatory sequential methods, where quantitative results are then explored further with qualitative methods; and exploratory sequential methods, which use qualitative methods to then develop the quantitative strand of the research (Creswell, 2014). There is overlap of the strategies throughout the thesis, as Study One used exploratory sequential methods to help develop Study Two. Study Two and Three then employed a convergent parallel mixed methods approach as baseline and endpoint data was collected at roughly the same time as each other. This is demonstrated earlier in the chapter in Figure 3.1. The rationale for this mixed methods approach included the opportunity for triangulation and complementarity, which is discussed later on in the chapter.

3.2.2 Pluralism and Research Philosophy

Mixing methods does not only refer to the mixing at the level of data (quantitative and qualitative) but also to the mixing of realist, interpretative and constructionist paradigms within qualitative approaches (Moran- Ellis *et*

al., 2006). This term is called ‘pluralism’. Pluralism in qualitative research combines methods, analyses or interpretations to seek multiple perspectives on human experience. Put simply, pluralism recognises that “a data set can tell us about a number of different things, depending on the questions we ask of it” (Willig, 2013).

It used to be the case that researchers were advised against pluralism at this level because of the challenges faced when using such an approach, such as attempting to mix disparate approaches, ensuring quality across the different approaches, and maintaining rigour if moving flexibly between approaches (Clarke *et al.,* 2015). However, there are strengths to utilising a pluralistic approach. People do not only express themselves through stories or talk in temporal terms about their actions and activities. The variety of human expression cannot always be adequately represented by one method alone. It is sometimes better served by using different analytical approaches to produce a richer understanding.

Methodological pluralism was used in this study to offset the limitations of one method with the strengths of another in analysing complex research problems (Madill and Gough, 2008). However, in order to avoid a tendency towards ‘unreflective eclecticism’, i.e. focusing on similarities between methodological approaches rather than differences, it is advised that researchers focus on integration by bringing methods together at least from three different perspectives to explore direct experience, intersubjective understanding, and systems perspectives (Madill and Gough, 2008).

Research philosophy is defined as a research paradigm; a framework which comprises perception, beliefs and the understanding of several theories and practices that are used to conduct research (Cohen, Manion and Morrison 2002). There are three main paradigms; positivism, interpretivism and realism. With regard to this thesis, although I am aware of the knowledge, beliefs and assumptions that I held as a researcher before starting, I did not proceed with an explicit research philosophy. However, through immersion in the PhD training programme, I have developed an understanding of the research philosophy concepts. On reflection, I believe I was leaning towards positivism at the start of the PhD. In this philosophical approach, scientists give their viewpoint to evaluate the social world with the help of objectivity in place of subjectivity (Cooper and Schindler 2006). I was interested in collecting data from a large sample instead of focusing on finer detail, and felt that the PhD would be largely quantitative data. As the PhD progressed and changed course, and my knowledge on action research and co-production developed, I feel I have moved more towards interpretivism. Interpretivism involves the study of phenomena in their natural environment. However, I agree with Burgess' (2002) standpoint on theoretical approaches, and that no matter what philosophy or theoretical approach is used, there are simply no 'neat-fitting' models that can be imposed on field situations and on data (Burgess, 2002, p 4).

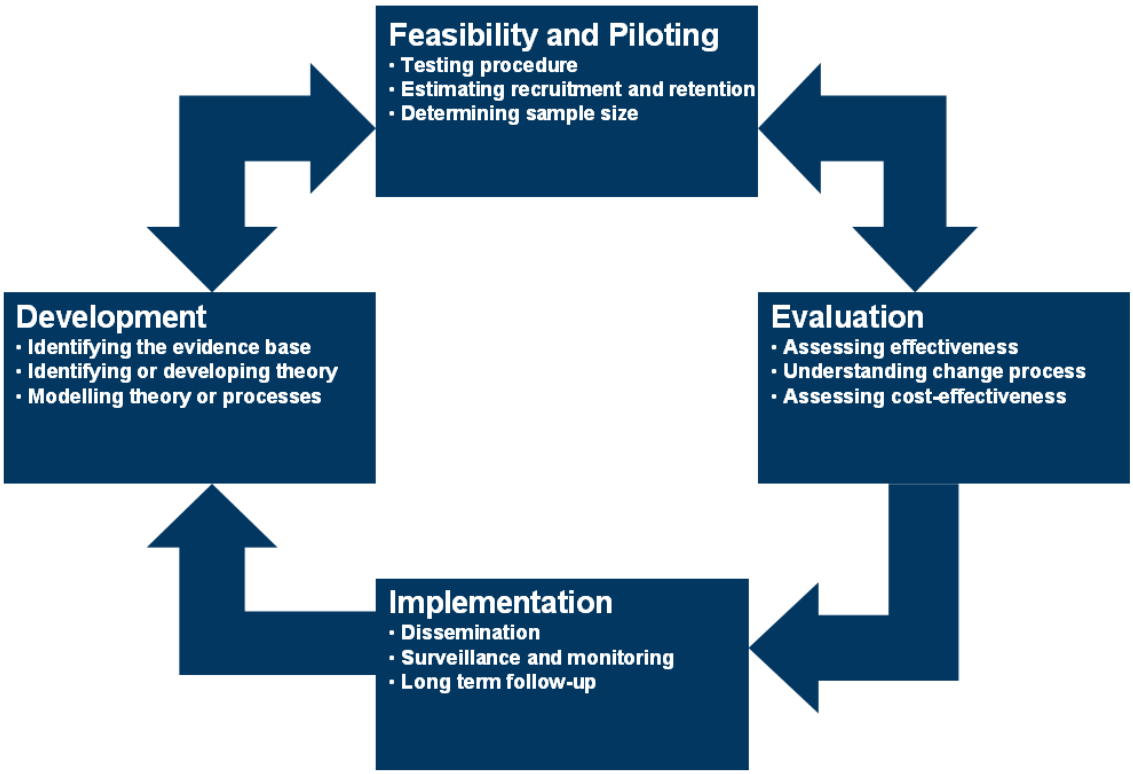
3.3 Research Methodologies

3.3.1 Feasibility Studies and the MRC Framework

The UK Medical Research Council (MRC) developed a framework and guidance document to assist the development and evaluation of complex interventions, which the authors of the guidance described as “interventions that contain several interacting components”, (MRC, 2008, page 7). However, Cohn *et al.,* (2013) argued that the revised framework didn’t address the actual question of ‘what constitutes the complex’. Their argument went one step further and suggested that the acceptance and ‘appreciation’ of complexity was not compatible with the ‘gold standard’ of evidence: the Randomised Control Trial (RCT).

The original MRC framework consisted of four stages; feasibility/piloting, development, evaluation and implementation. The guidance was updated in 2006 and a cyclic model replaced the linear relationship between the four stages implied by the previous guidance (Figure 3.2). This encourages interaction between the stages, for example, the implementation stage to be considered during the other three stages rather than solely after the evaluation stage. This updated version of the MRC guidance also focuses more on implementation.

Figure 3.2: The Medical Research complex intervention framework, Craig et al., (2008), page 8.



Adapted from "Developing and evaluating complex interventions: new guidance" [5]

Historically, scientists have favoured the RCT study design to provide the least biased results when analysing the effectiveness of interventions. Some researchers argue that only RCTs have the scientific rigour to produce reliable evidence. In clinical settings, RCTs can be achievable, but public health interventions, such as a community gardening programme, can rarely replicate the controlled environment of the clinic. These interventions are often community-based and recruitment can be challenging, creating a selection bias. As a result, maintaining pure control groups without cross-contamination may be impossible or impractical. Public health researchers must often rely on other types of study designs, often classified as lower on the "hierarchy of evidence" (Ogilvie, Egan, Hamilton *et al.,* 2005). An RCT

may provide rigorous study results for effectiveness questions; however, it might not be the best study design for other types of research questions (DiCenso, Prevost, Benefield *et al.,* 2004). In public health and health promotion, it may be difficult to use randomised trials for a particular question. Therefore we do not have the luxury to ignore evidence from other methods which also have the potential to produce high quality data.

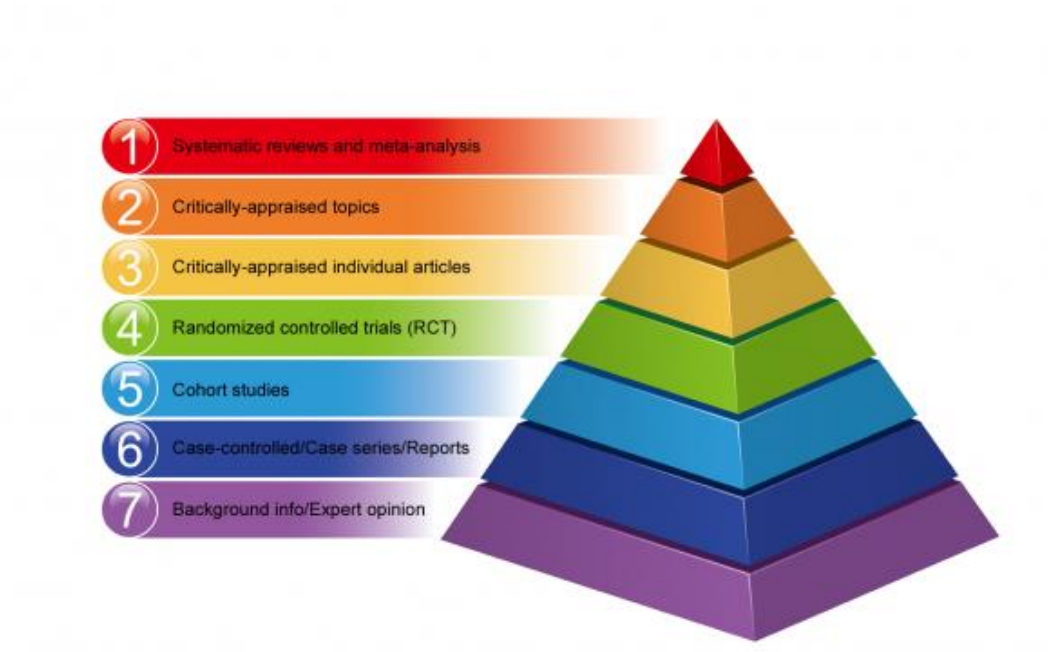
In the early days of this thesis, I started off with a protocol for a feasibility study, which could be easily identified within the MRC framework. *'Nourishing Neighbourhoods'* can be considered a complex intervention because of the range of possible outcomes, and the possibility of these outcomes interacting with one another. These outcomes range from bio-medical, organisational, psychological and social, and all have the potential for interaction. Therefore the MRC framework felt the most appropriate in the early stages. However, as the thesis progressed; I collected data in Study One; and I spent time training in other research approaches, I realised that the MRC framework and the feasibility study approach was no longer the most appropriate to use. It is becoming increasingly acceptable to move away from methods that are seen as the gold standard of evaluation, and to embrace a range of methods to capture relevant data. Smith and Petticrew (2010, pg 3) argued that *'public health evaluation…….will require a greater development of the methods of analysing and evaluating complexity'*. They argue that the current 'one size fit's all' stance is detrimental to the progression of public health evaluations, and feel that a variety of methodologies and outcomes will be of benefit whilst trying to observe the complexities of health and health behaviours.

One such methodology that is not classed as the ‘gold standard’, but can provide rich data is observational studies. This method for collecting qualitative data can provide valuable information for public health decision-making. Qualitative information can supplement statistical data by helping us understand the ‘who, why and how’ of intervention success or failure.

3.3.2 Hierarchies of Evidence

Over the years, hierarchies of evidence have been developed to showcase different research methods, and how they have been ranked in relation to the validity of their findings. Figure 3.3 shows a recent hierarchy adapted from Nichols (2018). Researchers who deviate from this hierarchy are often criticised for doing so.

Figure 3.3: Taken from ‘How Do Clinical Trials Work? Nichols, 2018.

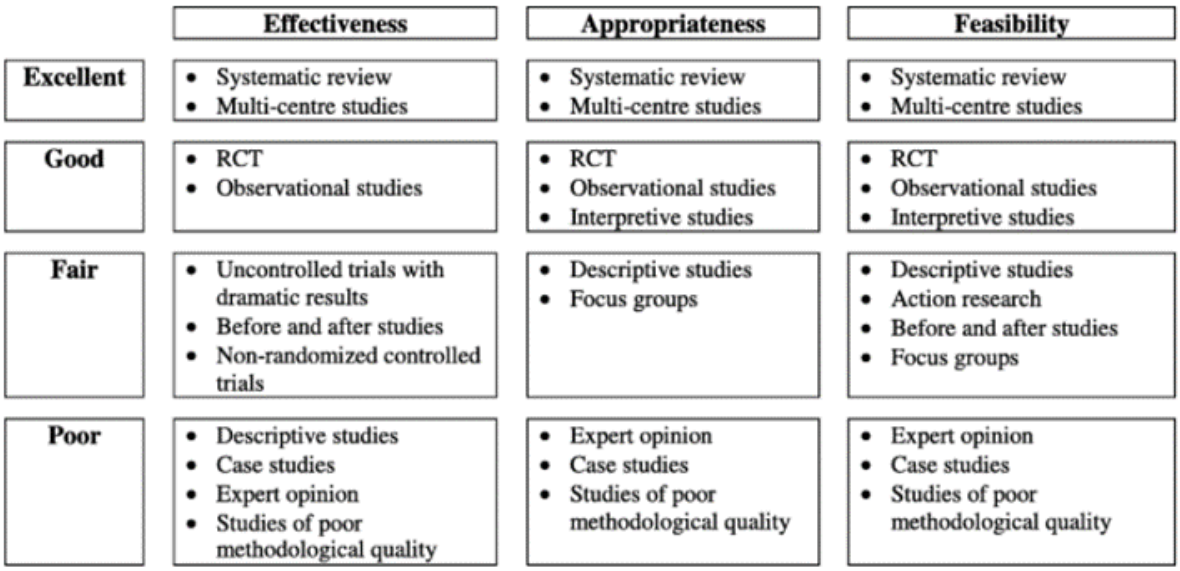


The problem with these hierarchies is that most focus on evaluation of the effectiveness of interventions. When the evaluation of an intervention

explores the appropriateness or feasibility of said intervention, then existing hierarchies are inadequate (Evans, 2003). This argument was supported with research by Petticrew and Roberts (2003), who suggested that there should be ‘horses for courses’ and the hierarchy shouldn’t be abandoned altogether, simply tweaked. Effectiveness is concerned with whether an intervention works as it was originally intended to, but what about whether the intervention is appropriate for a particular community? Another dimension concerns feasibility, such as the impact on those who deliver the intervention and the resources needed to implement it.

Following on from this critique, Evans *et al*., (2003) developed a hierarchy of evidence which focuses on three dimensions of the evaluation: effectiveness, appropriateness and feasibility, with four levels of evidence (see Figure 3.4). This hierarchy acknowledges the contribution of evidence generated by different types of research. The value of RCTs is not weakened, but it suggests that RCTs answer only some of the questions. Importantly, this framework acknowledges the contribution of interpretive and observational research, such as action research.

Figure 3.4: Hierarchy of evidence: ranking of research evidence evaluating health care interventions. Evans, 2003



	Effectiveness	Appropriateness	Feasibility
Excellent	• Systematic review • Multi-centre studies	• Systematic review • Multi-centre studies	• Systematic review • Multi-centre studies
Good	• RCT • Observational studies	• RCT • Observational studies • Interpretive studies	• RCT • Observational studies • Interpretive studies
Fair	• Uncontrolled trials with dramatic results • Before and after studies • Non-randomized controlled trials	• Descriptive studies • Focus groups	• Descriptive studies • Action research • Before and after studies • Focus groups
Poor	• Descriptive studies • Case studies • Expert opinion • Studies of poor methodological quality	• Expert opinion • Case studies • Studies of poor methodological quality	• Expert opinion • Case studies • Studies of poor methodological quality

3.3.3 Action Research

> "Action research...aims to contribute both to the practical concerns of people in an immediate problematic situation and to further the goals of social science simultaneously. Thus, there is a dual commitment in action research to study a system and concurrently to collaborate with members of the system in changing it in what is together regarded as a desirable direction. Accomplishing this twin goal requires the active collaboration of researcher and client, and thus it stresses the importance of co-learning as a primary aspect of the research process." (Gilmore *et al,* 1986, p 161).

Several attributes separate action research from other types of research. Its focus is on turning the people involved into researchers, too - people learn best, and more willingly apply what they have learned, when they do it themselves. It also has a social dimension - the research takes place in real-

world situations, and aims to solve real problems. Carr and Kemmis (1983) developed a simple model of the cyclical nature of the typical action research process (Figure 3.5). Each cycle has four steps: plan, act, monitor, evaluate.

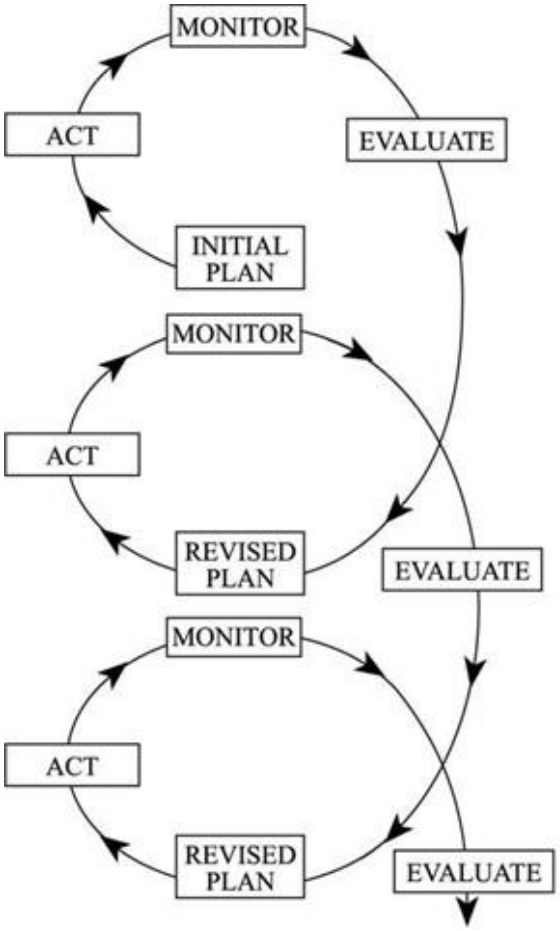


Figure 3.5: The action planning process, Carr and Kemmis (1983).

Action research is used in real situations, rather than in contrived, experimental studies, since its main focus is on solving real issues. It can, however, be used for preliminary or pilot research (O'Brien, 2001). It is often the case that those who apply this approach are practitioners who wish to improve understanding of their practice, social change activists trying to mount an action campaign, or, more likely, academics who have been invited into an organisation (or other domain) by decision-makers aware of a

problem requiring action research, but lacking the requisite methodological knowledge to deal with it (O'Brien, 2001). Therefore, due to its applicability to real world delivery, the involvement of local communities throughout the studies, and the research position of evaluating feasibility, action research was deemed the most appropriate framework for this thesis.

3.3.4 Longitudinal Qualitative Research

The use of qualitative research has a long history within social sciences (Pope and Mays, 1995). And more recently, the qualitative approach is gaining momentum and support as having the ability to contribute towards understanding complex and dynamic relationships that quantitative research fails to capture (Sofaer, 1999). The potential for qualitative research to do this is vital, as even though the understanding of health interventions has developed, the complexities of the relationships explored have left more questions unanswered than answered.

This research may contribute towards the growing body of evidence which supports qualitative health research as a valuable and effective research method. By clearly and systematically outlining my journey and approach throughout this thesis, the previous critiques of qualitative research being poorly documented and therefore unable to be replicated are diminished (Pope and Mays, 1995).

3.3.5 Ethnography

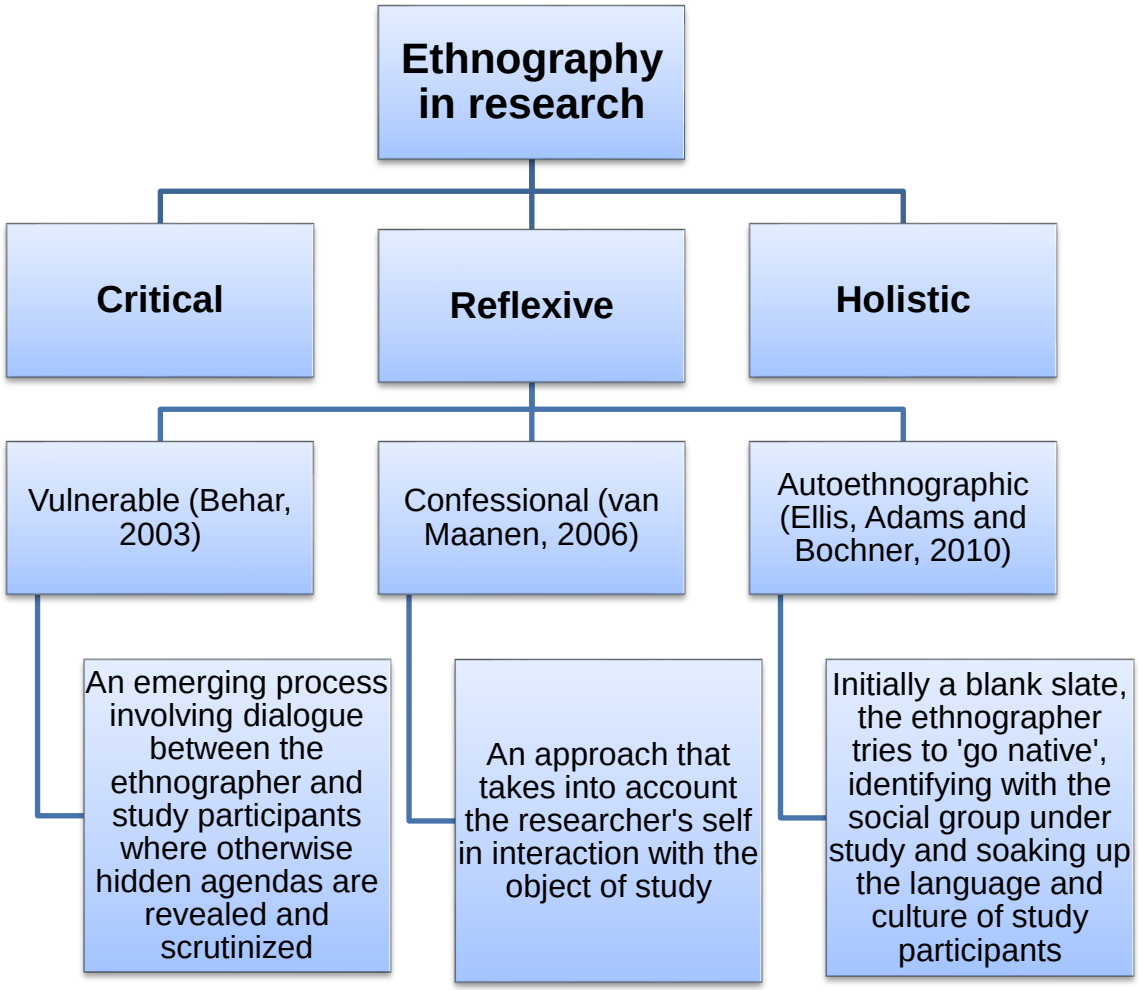
Ethnography is defined as the use of qualitative methodologies which seek to provide a detailed and in-depth description of processes and practices that occur in everyday life (Hoey, 2013). Ethnography is rooted within

anthropology and generally focuses on studying beliefs and practices within small-scale communities (Savage, 2000). Since the original use of this methodology it has gradually been incorporated into the methods utilised within other disciplines when a detailed description of processes is required (Hammersley and Atkinson, 2007). When considering that part of the focus of this thesis involved exploring the subjective entity of wellbeing, ethnography was identified as a valuable methodology. Spending an extended period of time in a community leads to the possibility of increased information concerning the changing dynamics that will occur over time when assessing health and wellbeing impacts within that community.

There are some criticisms of ethnographic research. It has been described as fuzzy in its nature, due to its undefined boundaries, loose definition and framework surrounding the method (Hammersley, 2006). However, this nature also provides benefits, allowing the research to become open to increased threads and lines of discovery. This complemented the complex nature of community gardening, and allowed for lines of enquiry that can develop unexpectedly along the way (Baxter and Eyles, 1997). There has also been criticism of ethnography for looking at surface events that can be observed easily. However, within this thesis, ethnography has been used alongside focus groups, to increase the depth of findings (Carpiano, 2009).

Ethnography can be '*Critical', 'Reflexive'*, or '*Holistic',* as outlined in Figure 3.6

Figure 3.6 The spectrum of ethnographic research methods. Adapted from Myers, 1999.



As a researcher, using principles of ethnography and autobiography creates the method autoethnography; *'both process and product' (*Ellis, Adams and Bochner, 2010), and identified as a '*reflexive'* approach in the spectrum of ethnographic methods in Figure 3.6. The method uses self-reflection and writing to enable the researcher to explore anecdotal and personal experience to connect an autobiographical story to wider political, cultural and social understandings (Adams, Jones & Ellis, 2015). It is a method where a researcher can acknowledge that they may at times be subjective,

have emotions that arise through their research, and have the potential to influence. Autoethnography provides the arena for this acknowledgement. With my role within this thesis, I felt that autoethnography was the most suitable approach, as it would give me the opportunity to record participants behaviour and interactions as well as reflect on my own, and study these alongside traditional analysis (Ellis, Adams and Bochner, 2010).

3.3.6 Triangulation

Triangulation is a method used to check and establish how trustworthy research is by analysing a research question from multiple perspectives and where results from one method are enhanced and clarified by combining with another method (Bryman, 2006). In social science, triangulation is defined as the mixing of data or methods so that diverse viewpoints or standpoints cast light upon a topic. The mixing of methodologies, for example, mixing the use of survey data with interviews, is a more profound form of triangulation (Olsen, 2004). In addition to establishing trustworthiness, triangulation allows a deeper understanding of a topic. This is not necessarily for consistency across different perspectives but to explore an issue from different perspectives. However, it can be a time consuming process in accessing and arranging the collection of data from all of the relevant stakeholders.

Once the qualitative focus groups from Study Three were carried out and analysed separately, they were combined with the quantitative data collected during Study Two at the ‘analysis/interpretation’ phase (O’Cathain *et al.*, 2010). Within this approach it is explicitly recognised that qualitative and quantitative methods may be used to examine different aspects of an overall

research question (O'Cathain *et al.,* 2010). The analysis is described in further detail in chapter seven.

3.3.7 Sampling Strategy

The focus of the research was on the generation of rich data on the topic of community gardening and the impact it has on health. In qualitative research, the target of a required number of participants is a contentious issue. The criteria and justification are more suited to the nature of the participants within the study, i.e. were they representative of the population or not. There are various types of research sampling strategies, these come under two broad categories which are probability sampling (random, chance) and non-probability sampling (Burgess, 2002). Probability samples are representative of a population whereas non-probability samples are not truly representative, which affects generalisability (Burgess, 2002). In qualitative research, a sample is mainly selected using a non-probability strategy because the approach focuses on identifying social constructs, and understanding themes that emerge from the data. The non-probability approach used in this research was convenience sampling.

Convenience sampling is using a sample that is readily accessible and available to take part in data collection (Cresswell, 2013). The strategy assembles an available sample that can provide relevant insight into a research question. A weakness of this approach is that participants are self-selected and may have particular issues that they want to discuss. Convenience sampling was used for all three studies. For example, only participants who contacted me after seeing '*Nourishing Neighbourhoods'*

advertised were invited to take part in the programme, and consequently, the evaluation.

3.4 Research Methods

3.4.1 Study One

The choice of data collection method for Study One was focus groups. A focus group is defined as a group of interacting individuals having some common interest or characteristics, brought together by a moderator, who uses the group and its interactions as a way to gain information about a specific or focused issue (Marczak & Sewell, 2007). Focus groups are a way to get to know the needs and wants of local communities. They can help produce data and insights that would be less accessible without interaction in a group setting. They involve listening to other people's experiences in such a way that it helps to stimulate memories, ideas and experiences in participants (Lindlof & Taylor, 2002). Unlike the one-way flow of information in a one-on-one interview, focus groups generate data through the give and take of group discussion. Listening as people share and compare their different points of view provides a wealth of information—not just about what they think, but why they think the way they do.

A focus group allows multiple people to share and discuss their views on a topic at one time. Focus groups have similar advantages to interviews as they can be in depth about a specific topic. They may evoke conformity from group responses but the discussion between participants may enable them to explore concepts differently and to balance views. Unlike one-to-one interviews, focus groups can be used to collect data from multiple

participants in a short time frame, and consequently the process of transcribing, analysing, and interpreting data can be undertaken more quickly.

A disadvantage of focus groups is that they can be controlled by more vocal members, leading to inhibited responses from quieter members of the group. There may be reluctance among participants to disclose information in a public setting compared to a one-to-one interview. They can also be more difficult to set up as they require the availability of people at the same place and time (Burgess, 2002). Focus groups were selected as I felt this would be an empowering approach for participants. It can enable individuals to '*share their stories, hear their voices, and minimise the power relationships that often exist between a researcher and the participant'* (Creswell, 2013, page 48). They were also selected due to time constraints. With 36 participants signed up initially to take part in the *'Nourishing Neighbourhoods'* intervention, it would have been time exhaustive to carry out pre and post-interviews.

The ideal size for a focus group for most non-commercial topics is five to eight participants (Krueger & Casey, 2009). Focus groups with more than ten participants can be difficult to control and in addition, limit each participant's opportunity to share insights and observations. Furthermore, group dynamics change when participants want to, but are not able to describe their experiences. A part of delivering focus groups involved developing a topic guide. The development of the topic guide for Study One was derived by integrating understandings from the literature and my own expertise working for Groundwork North East. This fits in nicely with the action research

approach as I was able to think about what real problems I had experienced so far in my job role, and develop the questions and prompts using these as a starting point for initial lines of enquiry (Carr and Kemmis, 1983).

3.4.2 Study Two

Study Two involved the collection of quantitative data in the form of measuring participants' BMI and distributing self-completion surveys. Three surveys were used to measure fruit and vegetable intake (Five-a-day Community Evaluation Tool), physical activity levels (International Physical Activity Questionnaire), and quality of life (SF-8). These surveys were selected due to their high levels of validity, their brevity (so as not to be too onerous for participants), and their credibility in the field of public health. In addition, the National Obesity Observatory (NOO) published guidance on diet and physical activity measurement tools to be used in weight management interventions (NOO, 2011). Although BMI is not a 'gold standard' measure of overweight or obesity, its advantages are displayed in terms of ease of measurement, established cut-offs, and existing published

statistics (NOO, 2009). A summary of the advantages of the various measures used are summarised in Table 3.2.

Table 3.1: A summary of the selected measurement tools advantages (Adapted from 'Measuring diet and physical activity in weight management interventions. National Obesity Observatory', March 2011)

Method of Quantitative Measurement	Description	Advantages
IPAQ	Consists of 5 categories: *job-related physical activity; transportation physical activity; housework, house maintenance, and caring for family; recreation, sport, and leisure-time*	Acceptable levels of reliability and criterion validity in this population Quick to administer and complete

	physical activity; and *time spent sitting.* For each topic in each category, subjects report the number of days per week and the time per day they usually spend doing the activity.	Free 'Gardening' included as an activity.
FACET	Requests participants to indicate on a 5-point scale (0 to 4+ portions per day) how often they consumed certain foods at various meal times during the previous day. Nine of the 14 questions are relevant to the assessment of fruit and vegetable intake. Part 2 of the questionnaire concerns health beliefs relating to fruit and vegetable intake: optimum fruit and vegetable intake levels; perceptions of current fruit and vegetable intakes; and perceived ability to change intake. Reliability and its ability to detect change over time has not been tested.	Described as easy to complete Free to use A valid tool that has good correlation with a food diary, although it may overestimate portions consumed.
SF-8	Measures the following eight ordinal items: general health, physical functioning, role physical, bodily pain vitality, social functioning, mental health and emotional roles.	Acceptable levels of reliability and criterion validity in this population Easy to use Estimated completion time of 1-2 minutes
BMI	The collection of height and weight to calculate BMI	Height and weight are easy to measure BMI has well established cut-offs

Five a day Community Evaluation Tool (FACET):

The dietary assessment part of the FACET questionnaire is a modified version of a short food-frequency questionnaire (FFQ) used by Cox *et al.,* (1997) to assess fruit and vegetable intakes in an adult British population. The FACET questionnaire is shown in Appendix B.

The International Physical Activity Questionnaire short-form instrument:

The IPAQ (Appendix C) assesses physical activity undertaken across a comprehensive set of domains including leisure time, domestic and gardening (yard) activities, work-related and transport-related activity (IPAQ, 2004). The IPAQ short form asks about three specific types of activity undertaken in the three domains mentioned and sitting. The specific types of activity that are assessed are walking, moderate-intensity activities and vigorous intensity activities; frequency (measured in days per week) and duration (time per day) are collected separately for each specific type of activity. The items are structured to provide separate scores on walking; moderate-intensity activity; and vigorous-intensity activity, as well as a combined total score to describe overall level of activity. Calculating the total score requires summation of the duration (in minutes) and frequency (days) of walking, moderate-intensity and vigorous-intensity activity.

SF-8 Health Survey

The SF-8 Health Survey (Appendix D) is an 8-item short form designed to provide a Health Related Quality of Life profile (HRQL) (Ware *et al.,* 2001). It is the most recent version of the (Short Form) health surveys, which are the

most widely used patient-based health surveys in the world (Ware *et al*., 2001). Several of the SF scales, especially the SF-36, based on 36 questions, and the SF-12, based on 12 questions, have been used extensively in outcomes research, case-control and cross-sectional studies, and clinical trials to monitor health outcomes and to assess HRQL in a variety of studies (Korfage *et al.*, 2005). The SF- 8 has been used in non-clinical, community-based studies (Neuhauser *et al.,* 2008; Mier *et al.*, 2008).The shorter version was selected for this study as although it is less sensitive than the longer version, it was much more time efficient to complete which I felt would be more appropriate for participants (Bowling, 2005).

All three SF surveys can be summarized into an eight scale profile that can be compared across the surveys. They also can be scored to report an overall measure of physical and mental functioning that is comparable among the surveys. Use of the scale to assess project success is common, measuring physical and mental health both before and after the implementation of a programme, with higher scores indicating better self-reported HRQL. Test–retest reliability of the SF-8 survey has previously been investigated and proven to be strong, indicating that the survey is sensitive to change, and can therefore be used to assess change in HRQL over time (Ware *et al.,* 2001). In order to calculate comparable scores, the SF-8 survey measures the following eight ordinal items: general health (SF8GH), physical functioning (SF8PF), role physical (SF8RP), bodily pain (SF8BP), vitality (SF8VT), social functioning (SF8SF), mental health (SF8MH), and emotional roles (SF8RE).

The self-reported surveys could lead to criticism that how people perceive their own health may be different to how their health actually is (Subramanian *et al.*, 2009). However, there is a strong relationship between self-reported and more objective measures of health (Kuhn *et al.*, 2006). How people perceive their own wellbeing is important. For example, it could be argued that the best person to rate their own quality of life over the past four weeks is the respondent themselves rather than someone external.

3.4.3 Study Three

Focus groups were used again in Study Three, but in a pre and post intervention format. The topic guide development for Study Three included the development of a pre-intervention topic guide and a post intervention topic guide. The pre-intervention topic guide utilised data gathered in Study One to help inform the questions. The post intervention topic guide was developed using some of the questions from the pre-intervention focus group, and through observations that I had made through the six month intervention.

In addition to focus groups, Study Three was informed by the principles of autoethnographic research. I observed participants throughout the sessions, and made notes after each session in a journal to be able to reflect upon and record data. Auto-ethnography is an approach to research and writing that seeks to describe and analyse an individual's personal experiences to understand cultural experience (Holman Jones, 2005). This approach treats research as a political, socially-just and socially-conscious act (Adams and Holman Jones, 2008).There has been previous research within the health and wellbeing field which has used observation to explore the social and

cultural complexities of communities (Cattell *et al.,* 2008). A strength of this data collection method was that the collection was continuous throughout the six month intervention, '*Nourishing Neighbourhoods'*, with the ability to record first hand data.

3.5 Reflexivity and Rigour

"A researcher's background and position will affect what they choose to investigate, the angle of investigation, the methods judged most adequate, the findings considered most appropriate, and the framing and communication of conclusions." (Malterud, 2001, p 483).

Reflexivity is commonly viewed as the process of a continual internal dialogue and critical self-evaluation of a researcher's position within the research as well as acknowledgement and explicit recognition that this position may affect the research process and outcome (Bradbury-Jones, 2007; Guillemin and Gillam, 2004; Pillow, 2003; Stronach *et al*., 2007). Through this process of self-reflexivity, I became increasingly absorbed within the field of research, sensitive to the lines of enquiry, emotions and actions that I was observing (Spry, 2001).

A researcher will undoubtedly have an impact on the interpretation of data collected and experiences of their life will shape their understandings. I have a psychology background coupled with an employment position (at the start of the research) embedded in the delivery of the research in question. However, I did not have any previous research experience prior to the thesis in the field of community gardening and had no pre-conceived ideas or experiences within research. I viewed my involvement with study as twofold:

that as the deliverer of the intervention, and that as the evaluator of the intervention. I viewed myself to be in a useful position as I was not bound by the success of the intervention to my PhD role fulfilment. Also, the research was not confined to predetermined hypothesis testing which may have hampered the analytical process. This allowed me to be independent when conducting the research. Additionally, there was no conflict of interest as the continuation of my employment did not depend on the success of the intervention. If it did, this may have potentially affected the interpretation of data.

However, my role as a researcher, admittedly, was not entirely as an 'outsider', as I was delivering the intervention. I stressed to the participants that my role as evaluator was completely separate to that of the programme delivery, and that my work commitment and my PhD were separate. If anyone wanted to only be in the project without being evaluated, that was fine. I think it was advantageous to my role that I was also a researcher/student rather than an external researcher coming in. I was able to build a rapport with people, rather than be viewed as a stranger.

Rigour is necessary to enhance the consistency and quality of qualitative research. It is the framework for establishing credibility and integrity of the research process. Rigour must be applied during all stages of the study, as methodological decisions can have implications on the quality, integrity and interpretability of the findings (McBrien, 2008). To establish qualitative research as credible, judgement is often derived from how trustworthy and transparent the research is. Lincoln and Guba (1985) have developed four criteria to demonstrate effective qualitative research (see Box 3.1).

Box 3.1: Criteria for assessing qualitative research, adapted from Lincoln and Guba (1985, pages 289-90).

1. Credibility: whether or not the findings are believable from the perspective of the participants.
2. Transferability: the degree to which the findings can be generalised.
3. Dependability: the need for the researcher to account for the ever-changing context within which the research takes place.
4. Confirmability: the degree to which the findings are established from the data.

By detailing what, when, and how data is treated, qualitative research is more likely to be acceptable by academic standards (Lincoln and Guba, 1985). To ensure that rigour was maintained throughout the study, a number of techniques were utilised. These included maintaining records of all focus groups and observations; using computer programmes to assist qualitative data analysis, therefore ensuring systematic analysis of data; and practising reflexivity (Mays and Pope, 1995).

3.6 Ethical Considerations

Ethics committees serve the purpose of protecting the rights of the participants, minimising potential harms and ensuring the integrity of research. Key concepts carefully considered by an ethics committee are possible risks (harms), confidentiality, anonymity, and data security. The ethical stance of a research project should be considered a continuous process and not a stand-alone event, i.e. just to receive a favourable opinion from an ethics committee. Conducting research is a process of renegotiating

barriers and overcoming obstacles to meet the original purpose of undertaking the research. As research evolves so too should ethical considerations, to protect those who participate.

All of the research was firstly reviewed by my supervisors, followed by the Durham University, School of Medicine, Pharmacy and Health Ethics Sub-Committee. One of the main ethical considerations arising from this research was the potential for coercion. There was an incentive to participate in Study One, which is discussed in greater detail in chapter four. After some deliberation, it was felt that the incentive was not great enough to make participants, especially those in a vulnerable position, feel that they had no other choice but to take part in the focus groups.

Making sure that participants, including myself, were protected from harm, whilst trying to follow the action research approach of being inclusive required constant attention. I already had a number of processes in place to avoid unnecessary risk and harm, by using an active risk assessment on site at each session. This allowed the assessments to be fluid, and flexible to the current environmental conditions, for example if the weather was particularly bad, ensuring there was appropriate shelter. I also wanted participants to feel like they could input into how the programme was delivered, so I empowered them with tool safety skills from the first session. In terms of personal safety, I had a buddy system in place with Groundwork North East, so they knew where I was at all times. And after each session, I would check in with a member of staff to let them know how the session had went, and to discuss any issues if they arose.

I made sure that the evaluation was not the focal point of the programme, so as to not exclude community members who may have only been interested in taking part in '*Nourishing Neighbourhoods'* without getting involved in the evaluation. I also made sure that potential participants knew that there was flexibility in the sessions to allow people from all different walks of life with varying capabilities to join in. Some of the tasks that take place when gardening can be tough physically, but there are other tasks that do not require as much exertion. Therefore it was important to get this message across to potential participants that there was a wide range of tasks that need to take place in a community gardening, and everyone can have a role to play, irrelevant of age, mobility, physical condition etc.

Another ethical consideration that required thought was ensuring the safety of the children and young people who were to be involved in the programme. Although children and young people under the age of 18 were excluded from the evaluation, they could still be involved as participants of '*Nourishing Neighbourhoods'*. I had to make sure that the sessions planned and risk-assessed were suitable for children, with necessary modifications in place for their learning needs. I had to make sure I was up to date with my CRB, and that I had carried out a refresher course on safeguarding issues. I also had to make sure that I had the consent of parents/guardians for the young people to take part and to include them in any photographs that were taken during the sessions.

With regard to the small sample sizes, additional work was required to gain ethical approval. This required careful planning to protect participant confidentiality and anonymity, which led to several changes in the

information sheets and methods of data reporting that were included in the application. This was to make sure participants were fully aware of the risks and knew that, despite best efforts to remove all information from transcripts that could be linked to individuals, they may still be identified. There was also an ethical challenge when it came to taking photographs for the study. I felt that documenting the journey of the community gardens and the participants through photography was important. As part of the intervention, it was agreed that there would be consent required to have photographs taken of participants which could then be used for research purposes. Participants were made aware that by agreeing to have their photographs taken may impact on their anonymity in the study.

There was potential for participants to find discussions about their experience uncomfortable if they had negative experiences, therefore I made sure participants knew that they could leave a focus group at any time if they did not wish to continue. It was also emphasised that even if a participant left a focus group, or indeed wanted to leave the evaluation in its entirety, they could do so without fear of being excluded from the '*Nourishing Neighbourhoods'* programme.

Although there was a significant amount of time spent negotiating the difficulties of obtaining ethical approval, especially for Study Two and Three, the ethical process did not stop. I had to constantly address ethical issues throughout the research, and the diaries that I kept were important in doing this, as they allowed me to have reflective time as a practitioner but also as an evaluator. The only way that a researcher can ensure they do not come across any ethical dilemmas was succinctly worded more than 60 years ago:

"The only safe way to avoid violating principles of professional ethics is to refrain from doing social research altogether" (Bronfenbrenner, 1952, p 453).

3.7 Analytical Approach

In this section the justification, assumptions and principles behind the techniques to analyse the data are discussed. This section describes how data were analysed, and the analytical process to ensure rigour.

3.7.1 Qualitative Data

All of the focus groups were audio-taped and then transcribed. The transcripts were only read by me due to a lack of resources, therefore emerging themes and ideas did not have the opportunity to be debated. However, I transcribed all the audio files personally, which allowed me the opportunity to re-visit the feelings of the focus groups, and not take anything out of context when reading them. Although it was a time-consuming process, it helped to engrain the focus groups into my thoughts assisting the analytic process. I knew when particular topics of discussions occurred across the focus groups so could quickly retrieve and recollect relevant sections. Furthermore, as I collected data over Study One and Three, I was able to explore similarities and differences between the cohorts.

The initial qualitative findings from Study One were presented at an international conference, which allowed further critical reflection on the data and enlightenment from international experts (Appendix E).

3.7.2 Quantitative Data

In order to investigate a secondary research aim, descriptive statistics were analysed using Microsoft Excel to look for differences between baseline data for the cohort and six months. It was felt that with such a small sample size, it would be inappropriate to run any tests on the data as there was not sufficient power, and any results would not be permitted to be generalisable.

3.8 Describing the studies through an action research cycle

From this point forward, the findings from the following chapter, chapter four, will be known as Study One findings. These findings were used to inform the main intervention. The main intervention that was delivered, *'Nourishing Neighbourhoods'*, will have results described in both chapters six (Study Two) and seven (Study Three). To help identify each study, identifying names have been given to each study:

- Study One: *Nourishing Neighbourhoods*; Informing a Health Intervention through Action Research
- Study Two: *Nourishing Neighbourhoods*; Examining the Statistics
- Study Three: *Nourishing Neighbourhoods*; Exploring the Narrative

In addition, an action research model developed by Coughlan and Coghlan (2002) shown in Figure 3.7 was utilised to develop an action research cycle for this thesis. Figure 3.8 was developed to bring the thesis journey to life visually, and to help the reader navigate and better understand the chronology of events. This figure also incorporates the notion of an iterative process used throughout the thesis.

Figure 3.7: Action Research Cycle. Taken from Coughlan, P. & Coghlan, D. (2002) Action research for operational management. International Journal of Operation and Production Management, 22 (2), pp 230

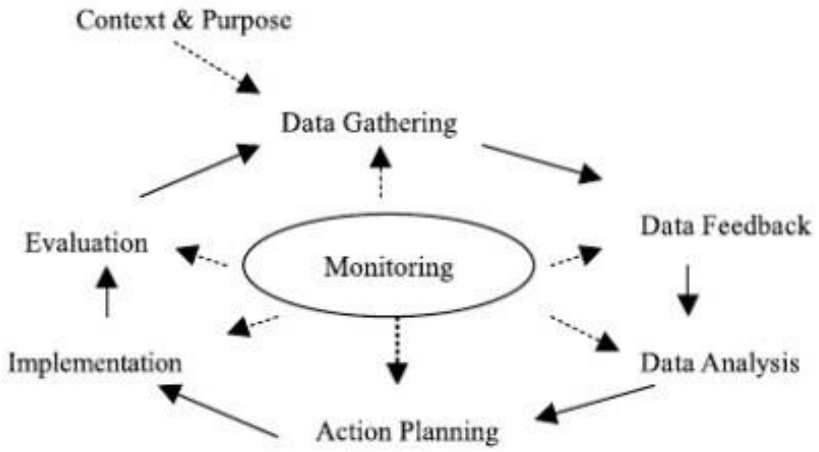
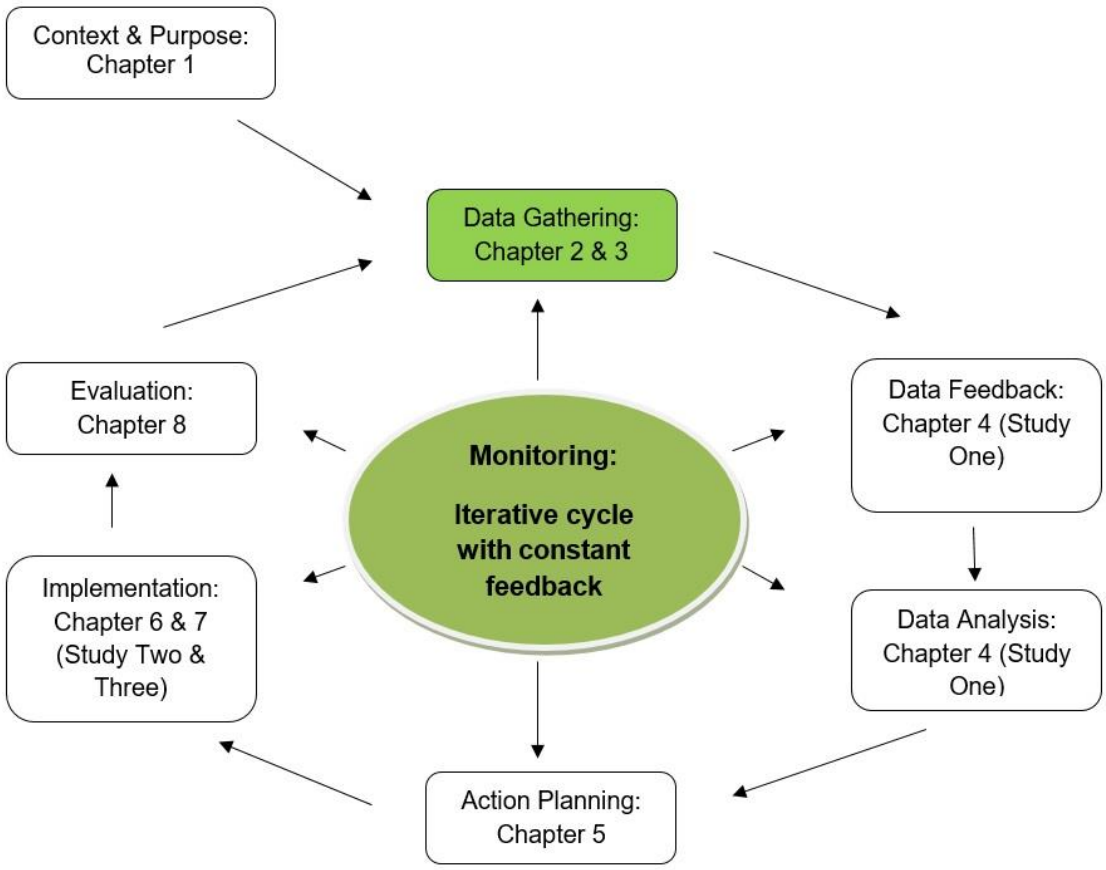


Figure 3.8 highlights that chapter two and three describe the gathering of data to be able to inform Study One, which is presented in the next chapter.

Figure 3.8: The Action Research Cycle: How chapters two and three sit within the thesis



3.9 Summary

This chapter has described and provided a rationale for the choices of research methods used. Mixed methods research has a strong emphasis on transparency, hence it is crucial to uncover what decisions were made and why. The ethical considerations were outlined, with protection of the anonymity and confidentiality of the small samples being of utmost importance. The action research approach was introduced to set the scene of the thesis, even though this approach was not used from the outset, to continue with the transparent nature of the research. In addition, an action research cycle was developed to help navigate the journey through the rest of the thesis.

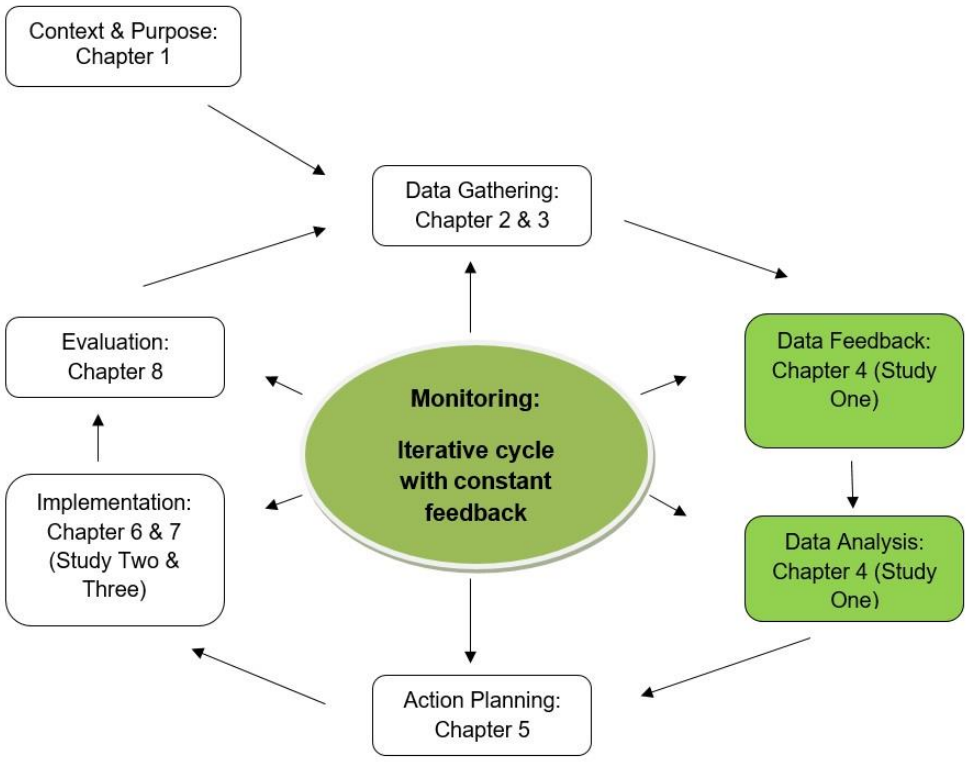
CHAPTER FOUR: STUDY ONE – NOURISHING NEIGHBOURHOODS; INFORMING A HEALTH INTERVENTION THROUGH ACTION RESEARCH

4.1 Introduction

Chapter two described a critical literature review of existing research around the impact of community gardening on health, and highlighted that the majority of evidence reviewed focussed on qualitative data. Limitations in the quality of research and the context in which it has been delivered highlight a gap in the research field. It is clear that research in this area is challenging due to the complexity of the intervention and the number of health outcomes that could be affected. Chapter three then discussed the value of employing an action research approach and working alongside communities. The purpose of this chapter is to establish what a community gardening intervention would look like to those of whom it mattered the most; i.e. the community members. This chapter presents the findings from Study One, a focus group study exploring the needs of local community members in County Durham, and their attitudes towards engaging in a community gardening programme. The intention was that this data would then be used to inform the main intervention, *'Nourishing Neighbourhoods'*.

Following on from Figure 3.8 in the previous chapter, Figure 4.1 highlights the feedback and analysis process that Study One encompasses in the iterative research cycle.

Figure 4.1: The Action Research Cycle; Where Study One sits within the thesis



4.2 Rationale

The evidence base, described in chapter two, suggests that community gardening has the potential to have a positive impact across a spectrum of health outcomes, covering both physical and mental health domains. However, before describing the effectiveness and benefits of community gardens in detail, it is important to understand the communities within which such a project could be developed, i.e. the context. Without knowing the needs and wants of a community, it is difficult to determine what would be required to reach out most effectively and engage individuals and families in a community garden scheme.

Co-production is not a new concept – it was at the heart of early research in service management (Normann, 1984), where it was argued that a key characteristic of services is that the client appears twice, once as consumer and again as part of the service delivery system. What is new, however, is that in recent years organisations in the public and private sectors have shown a greater interest in exploring the potential involvement of service users and communities in the design and delivery of services. Over the past few years, there has been a growing interest and investment in embedding assets-based approaches such as co-production and community based research in reshaping how public services are designed and delivered (South, 2015). That is, looking to internal resources and local knowledge to find solutions to tackling inequality through collaborative working, community-led activity and creatively engaging with people in informing and influencing decision making.

Co-production is rapidly becoming one of the most talked-about themes in public services and public policy around the world (Bovaird, 2007; Bovaird and Loeffler, 2013). The Governance International Co-Production Star (Figure 4.2) visualises the ‘Four Co’s of co-production’, including co-commissioning, co-design, co-delivery and co-assessment of public services in the outer ring.

Figure 4.2: The Governance International Co-Production star (Governance International, 2013)

By including communities as co-designers of an intervention, the opportunity arises to really tailor the intervention for that specific community. Interventions that are tailored are generally perceived to be more successful (Visram, Clarke *et al.*, 2014).This involves *"delivering public services in an equal and reciprocal relationship between professionals, people using services, their families and their neighbours"* (Boyle and Harris, 2009).The reasoning behind this is that a tailored approach usually involves improving self-esteem, self-efficacy and confidence, which is thought to be critical in healthy behaviour change (Gardner *et al.,* 2010). O'Mara-Eves *et al.*, 2013 argued that by involving communities in co-designing a health promoting intervention programme, the programme will be more likely to suit the specific needs of that particular community. It is also more likely to draw on a much wider base of expertise, as demonstrated by Figure 4.3, which outlines

the overlap between community assets, individual assets and service provider assets (Bedford, 2015).

Figure 4.3: Examples of individual, community and service provider assets, (adapted from Bedford, 2015).Supporting a co-production approach to improving health: The role of health psychology, page 4

4.3 Aims and Objectives

4.3.1 Aims

The aim of Study One was to engage and involve local people in the development of a tailored community gardening intervention and its evaluation. This intervention will be described later on within this thesis.

4.3.2 Objectives

- Explore the needs of local communities in terms of setting up a community gardening programme.

- To establish appropriate, feasible and acceptable data collection methods (for measuring levels of physical activity, dietary intake,

anthropometric measurements and health and quality of life measurements) for the main intervention, '*Nourishing Neighbourhoods'*.

- To make any adjustments to procedural aspects of the main intervention, *'Nourishing Neighbourhoods'* (Study Two and Three*)*, to accommodate community perspectives and values.

4.4 Study Design

Study One was informed by a co-production approach, and utilised a qualitative design, which allowed participants to describe their experiences and perspectives in their own words (Green and Thorogood, 2014). The intention was to inform the subsequent evaluation of a tailored community gardening intervention, the results of which are reported in chapters six and seven. Figure 4.4 shows the flowchart for Study One, which will be described throughout this section.

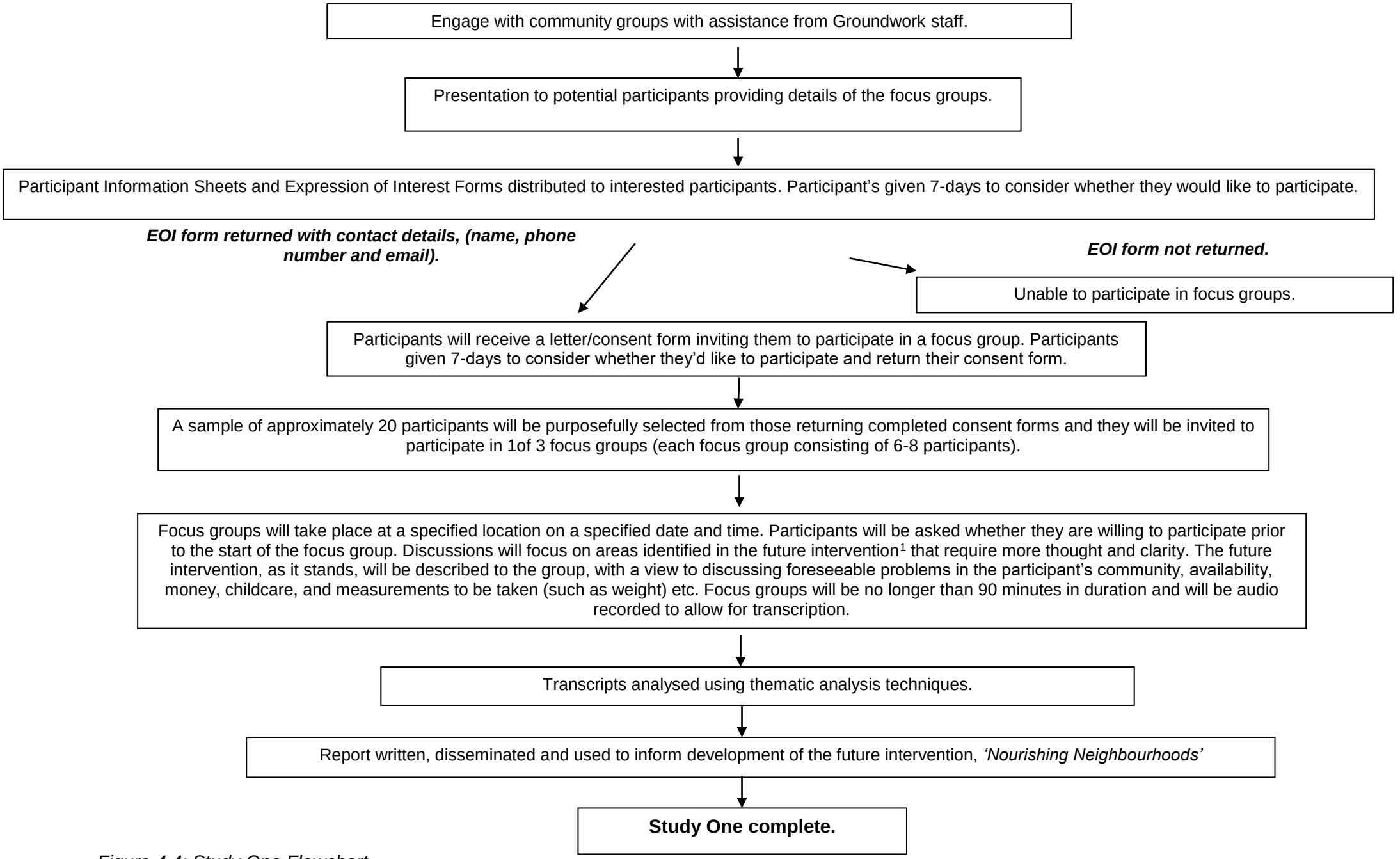


Figure 4.4: Study One Flowchart.

4.4.1 Methods

Focus groups were used to attempt to elucidate the attitudes and opinions of local communities with regard to community gardens within County Durham. Following on from these focus groups, Study Two and Three investigated the benefits and disadvantages that allotments and gardens can potentially provide to local communities, in terms of health, well-being and other outcomes including physical activity, diet, nature of community gardening use and attitudes towards sustainability.

4.4.2 Study Setting

Three community venues in County Durham were utilised in Study One; this locality was chosen for pragmatic reasons associated with my previous employment with Groundwork North East. County Durham has an estimated population of 513,000 (2011 Census), which is an increase of 3.9 % over the previous ten years. The 65+ age group is projected to increase by 37 % by 2030, and the 85+ age group in the county is predicted to double. Life expectancy is below the England average, with males at 78.0 and females at 81.3 (England average: 79.4 males, 83.1 females). There is also a difference in life expectancy within the county, with men born in the most affluent areas living 7.9 years longer than those born in the most deprived areas. It is a similar picture for women, with a difference of 7.7 years (PHE Health Profile, 2017).

In 2015, County Durham was ranked as the 75th most deprived area out of 326, which is 13 places higher than 2010, but this trend hides declines in

specific areas of deprivation: the health domain, income domain and income deprived child domain, reflecting increasing inequality in these areas (County Durham Indices of Deprivation, 2015).

County Durham has 36 lower layer super outputs areas (LSOAs) ranked in the top 10 % most deprived areas in England (County Durham Indices of Deprivation, 2015). These were designed to improve the reporting of small area statistics. All three sites used in Study One were located in these LSOA areas, characterised by socioeconomic disadvantage and health inequalities. These particular sites were chosen as they were within driving distance (within 50 miles) for me, and were accessible community venues that were well known in their respective localities. The venues were visited by myself prior to the study commencing to confirm that they were fit-for-purpose. Fit for purpose meant that the venues needed to have a room available that was large enough to sit ten participants and myself comfortably.

4.4.3 Recruitment

Participants were recruited via a convenience sampling approach, which is commonly used in exploratory research (Creswell, 2013). Various recruitment methods were employed in order to achieve a heterogeneous sample in terms of age and gender. This was important as it enables the results to be closer to an accurate representation of the population. The focus groups were advertised on posters and flyers (Appendix F) in community centres, in local newsletters, and via social media (Facebook and Twitter). These recruitment methods were chosen because of the social media platform that Groundwork North East already had and used to advertise community programmes. We also used local community centres to

display posters and flyers due to the natural footfall of community members through them. Local newsletters were also chosen, as they went out to every household in the community, and I was also able to put promotional information in them free of charge. I arranged to meet with interested individuals via the key contacts at local community groups. I was flexible with what day and time I met with the interested individuals, and used the locations selected for the focus groups to meet them. The focus group was explained to these individuals and information sheets and consent forms distributed. Individuals then had seven days to consider whether they wanted to participate in the project and return their completed consent form and personal details form to a key contact identified within the community group either in person or in the post, who then forwarded them onto me. One focus group took place on a midweek afternoon (2pm), one took place on a midweek evening at 6pm, and the final focus group took place on a Saturday morning at 10am.

All participants received a shopping voucher to the value of £10 following the completion of the focus group. This incentive was funded by Groundwork North East. Participants were made aware of this incentive in advance as it was detailed in the participant information sheet.

4.4.4 Participants and Sampling

Twenty seven signed consent forms were received in total. Interested individuals also informed the key contact when would be most appropriate for them to attend a focus group, i.e. during the day, evening, weekend. This information was then used to ensure that the focus group was held when the majority of interested individuals were available, in the community centre that

was closest to them. Seven interested individuals did not take part in the focus group as the day and time was not feasible for them. A total of 20 participants took part in one of three focus groups (n_1= 8, n_2= 6 and n_3= 6). There were eight male and 12 female participants, ranging in age from 18 to 69 years (M = 41.6 years). There were some participants who were known to each other, either as family members or friends. I was also known to some of the participants, due to my work in their community with Groundwork North East.

4.4.5 Data Collection

The focus group method is known to be useful when seeking to explore the degree of consensus on a given topic, as well as generating additional insights through the interaction between participants (Morgan, 1997). Discussions were facilitated by myself and structured around a topic guide developed from existing literature on community gardening, seen in Box 4.1.

Box 4.1: Topic guide used in Study One focus group

Development of a new allotment area

- Do you think there is a need for this facility in your community?
- Where do you think there is a general need for this facility in your community?
- Physical layout? Opening hours? Charges?
- Any other elements that you believe this facility should cater for?

Recruiting members

- What would be necessary to attract you to get involved? Encourage new users?
- How could we best tell people about it? Specific things to say? Ways of communicating?

Barriers

- What might stop people becoming involved in a community allotment? Why?
- How can these barriers be overcome?
- Looking back, what do you feel were the really big barriers, and what were the best suggestions for overcoming them?

Data collection during the intervention

- Is there anything you would feel uncomfortable with if you decided to take part in the data collection aspect of any future intervention?

End question

If you had one piece of advice on how to get people like you interested in becoming involved with a community allotment/gardening programme, what would it be?

Ideally, focus groups should involve two facilitators, as, depending on your aims, it may also be helpful to include observers in addition to the facilitator, either for writing notes or 'sparks' or to take a role in the discussion and offer opposing arguments to encourage new ideas into the group if necessary (National Co-ordinating Centre for Public Engagement, 2017, p. 1). Due to the financial constraints with resources, a second facilitator was not an option for me. This had its limitations in the fact that I was faced with undertaking multiple tasks: listening to people, writing notes, observing body language and ensuring that I was giving out positive body language. Therefore, I attempted to lessen the impact this had on data collection by doing everything I could to make participants feel comfortable right from the beginning and providing refreshments such as tea and coffee. This allowed the environment to develop into a relaxed informal one, and meant that when I was writing notes and not able to give eye contact to the group, there was already a comfortable atmosphere. Each focus group lasted between 35 and 50 minutes and was audio-recorded with participants' informed consent.

4.4.6 Data Storage and Analysis

Focus groups were audio-recorded and transcribed verbatim by me. The resulting transcripts were entered into NVivo v.9 for management, before being analysed using a thematic framework approach (Morgan, 1997). This process incorporated both deductive categories (derived from the topic guide) and inductive findings (unanticipated responses from participants). These transcripts formed the heart of the data analysis, with the first stage of analysis involving careful reading of the focus group transcripts. The initial coding process took place manually to ensure that I was continually

immersed in the data. Data were extracted manually from the transcripts and placed on four separate charts for further analysis. Following on from this, sub themes were identified. A simple process of using different coloured highlighters to separate the different themes was used. This allowed for the data to be easily identified during further analysis. This resulted in the development of a coherent, consistent set of themes and subthemes that was used to guide interpretation and organisation of the results reported in this chapter.

4.4.7 Ethical Approval and Considerations

The ethical considerations for all studies within this thesis were discussed in chapter three. To ensure that ethical considerations were reflected in the research design, an application for ethical approval was made to the School of Medicine, Pharmacy and Health at Durham University. This study was approved on 27th July 2012 by the School's ethics sub-committee (Reference ESC2/2012/08). The table below shows the various appendices required for the ethics application, and the corresponding appendices reference for this thesis. The approval letter is also included in the thesis appendices (Appendix G).

Table 4.1: Ethics application appendices for Study One

Ethics Application Forms	**Thesis Appendix**
Participant Information sheet & EOI	H
Participant consent form	I
ORB Lone working policy	J
Risk Assessment	K
Risk Assessment	L

4.5 Findings

A number of themes and sub themes emerged from the data collected. There were three overarching themes:1) Physical features of community gardening sites; 2) Practical barriers and facilitators to accessing community gardening programmes; and 3) Social factors impacting on uptake and retention.

Within these themes, there were various sub themes (which are identified in Figure 4.5). This section will discuss the themes and sub themes in more detail, and discuss the impact that they could potentially have on the future development of the intended intervention, *'Nourishing Neighbourhoods*'. Throughout this section, findings are demonstrated using direct quotes from the transcripts, anonymised to protect the participants' identity.

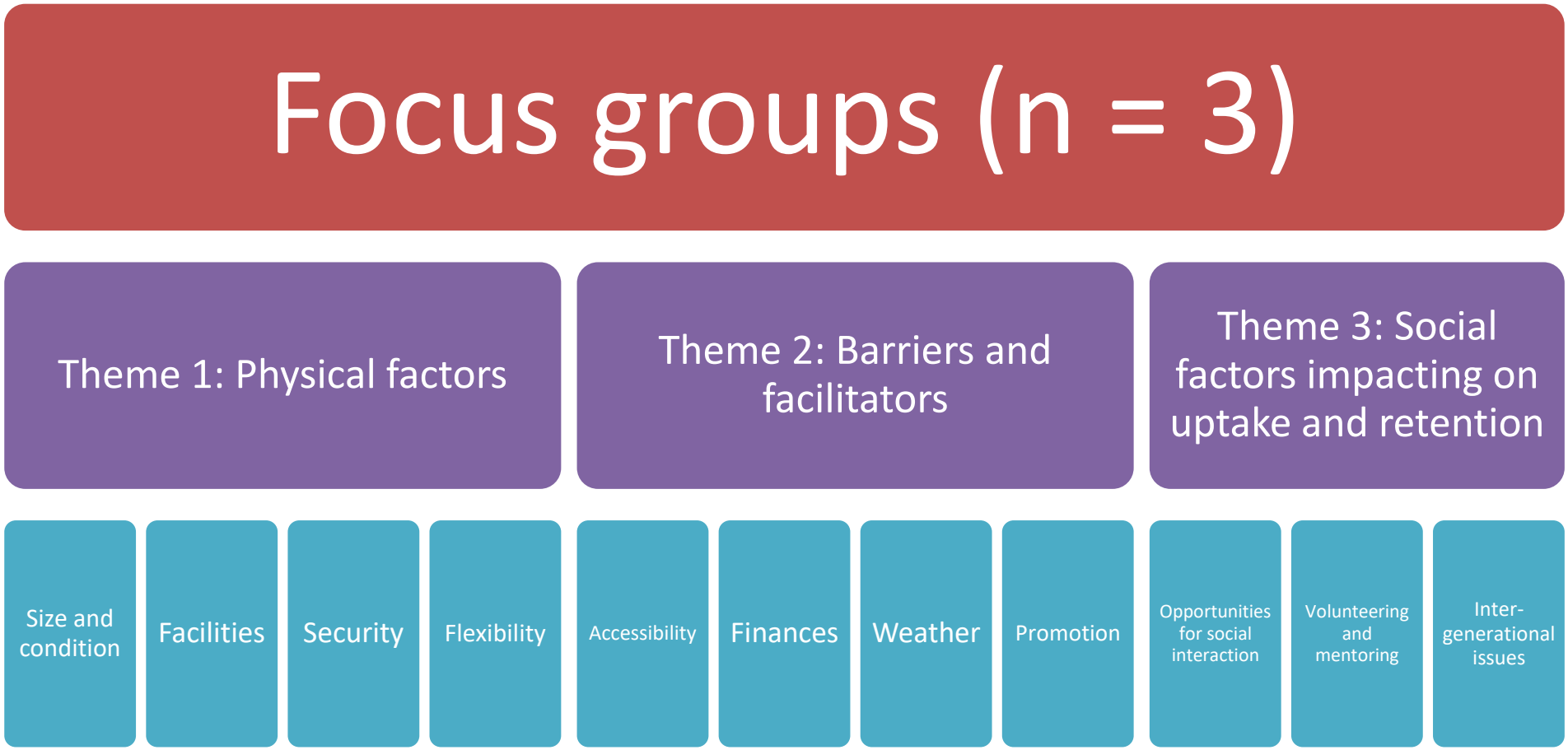


Figure 4.5: Visual depiction of overarching and sub themes derived from Study One focus group analysis

4.5.1 Theme 1: Physical features of community gardening sites

Size and condition

There were conflicting views on the ideal condition of a community garden when being used for the first time. Some participants were happy to 'start from scratch', whereas others were worried about taking on something that would require a considerable amount of time and effort to develop:

> *"It's like a jungle… To be given [a garden] in that condition is really quite hard, so I think if I was going for an allotment I would be a bit like you and I'd want it to be kind of… … in an alrightish state." (P8)*

Size was also felt to be an important consideration as a large community garden could be off-putting, particularly to beginners:

> *"I think that would be the barrier for me I think if I went down and they said, 'Right, you can have that one' and it was enormous. I think I would be a bit overwhelmed." (P4)*

Facilities

A key discussion point concerned the need for community gardens to have certain fundamental facilities in order to encourage participation by community members. Having access to running water on site was described as a 'deal breaker', to avoid walking long distances while carrying full water cans. Poly tunnels (polythene-covered frames under which seeds and plants are grown outside) were also frequently mentioned:

*"So I reckon with the c**p weather that we have in this country… poly tunnel! It's great to have a community garden, but in the UK our weather is all over the place, and we don't have a lot of warm months, so we need all the help we can get." (P15)*

The potential benefits of having some kind of storage facility were identified by several participants, both in terms of being able to store tools securely on site and also providing a social space for people to rest and 'have a natter':

"We really need somewhere that we can keep our tools don't we? As I don't fancy having to carry mine every time I leave the house. I know an allotment site in [name of place], they have a big unit on the site, like a metal container, and they have all kinds in there. They keep their tools, their paperwork, they have items that people can buy, and they also have a few chairs where people can go in and have a cuppa from their flask." (P11)

Security

Security was felt to be an important aspect of any community gardening site. There were concerns about items being stolen as well as the physical safety of people using the gardens. One participant spoke about a situation she had heard about from a friend:

"[Thieves] are going in taking everything, everything's getting replaced and two months later they're coming back and taking everything again, and I think that is an issue. Security is an issue, and I think as well, for me, I'm going to be a total girl about this,

but I think for me if I was in the garden and there was no-one around I'd rather know that people had to open the gate to get in." (P19)

A potential solution was identified by a number of participants, who suggested locking the sites and giving members a key so that they could feel more secure.

Flexibility

It was felt that having some flexibility in the way the gardens were organised would be key to engaging more local people in community gardening programmes:

"To have the flexibility to have a bit kinda more garden as well so it's not just veg, 'cos sometimes I think that would resemble more of an allotment site. Not everyone in this area will want to grow vegetables. Some, like my aunty, well they would probably just prefer to have a little patch to grow flowers." (P1)

Others suggested that having dedicated areas where younger children could play might be a good way to involve families and keep them engaged in community gardening:

"I know with my lot [family], getting them along isn't the problem, it's keeping them there. It would be great if there was like, a bit of err, maybe have a bit of grass for kids to play on or something. So that you could still keep an eye on them and still stay involved in the gardening." (P4)

4.5.2 Theme 2: Practical barriers and facilitators to accessing community gardening programmes

Accessibility

The distance from participants' homes to the community garden was the most frequently cited factor in the decision to attend a community gardening programme. There was a preference for sites 'on your doorstep', particularly for those in full-time employment:

> *"if it's such an effort to get there, you've lost them before you even get there and start doing anything, especially… I think for older people who've got the time on their hands maybes don't mind the walk so much, but for me I'd rather not have to take the car." (P6)*

Poor access was cited as a key barrier to attending existing community gardening programmes, linked to the physical features of these sites:

> *"The ones I've seen are often like off little tracks that are poorly maintained as well so they tend to be like all pot-holey and get flooded and things. So that might be an issue for a lot of people as well, especially in the winter." (P17)*

Weather

Weather conditions in the UK were mentioned as potentially affecting attendance and long-term engagement with outdoor activities such as community gardening:

> *"The weather makes such a difference to doing any activity outside, not just gardening. The last thing you want to do is be*

caught out in the pouring rain with no shelter. And of course as the seasons change, so does the weather and the amount of daylight hours we have to actually get any work done [in the garden]." (P20)

As mentioned above, poly tunnels were suggested as a way to work around this issue.

Finances

Some participants identified financial barriers related to taking part in activities and spoke about the fact that up-front costs could potentially put people off:

"Starting from scratch… … Who is going to pay for tools? Gloves? Seeds? Compost? It can all add up". (P5)

However, they also discussed being able to feed their families at no or low cost as being a facilitator to getting involved in a community gardening programme. Some offered suggestions on ways to make use of available resources in order to reduce costs:

"My granddad would never buy anything new for his garden… … He would collect wooden pallets, sheets of glass, tyres, odd bits of wood, drain pipes. You name it, he kept it. Nothing was scrap. Anything could be recycled and be made into something useful". (P2)

Promotion

A number of potential mechanisms were identified for engaging local people, and sustaining their involvement in community gardening programmes. It was felt that a good way to 'kick-start' a programme and recruit participants would be to host an open event:

> ***"****Well maybe if you have got a communal area to have a little open event if you need to recruit people. Most allotments have a bit of a waiting list and they don't really need to promote what they're doing by the sounds of it. But a community garden is different, and may attract different members of the community, especially families." (P8)*

Another suggestion centred on the possibility of offering a free promotional item to generate interest in the project:

> *"Something that is always guaranteed to get someone's attention, especially in this community, is if there is something going for free (laughs). Whether it's a packet of seeds, or a hand trowel… … I think that would definitely get people interested." (P18)*

The importance of continual promotion of the gardens was discussed. Notice boards and newsletters were suggested as potentially effective ways to get messages out to new and longstanding members of the local community:

> *"If I was new to an area and I happened to be walking past and I [saw a notice board], 'Oh they've got a community garden here, champion, right how do I, who do I contact?'" (P10)*

4.5.3 Theme 3: Social factors impacting on uptake and retention

Opportunities for social interaction

Community gardens as a mechanism for developing new friendships and interacting with other community members was a popular topic within the focus groups:

> *"When you are retired you just tend to go a bit stale, sitting in the house doing nowt. But with gardening, there is the chance to meet people, mix with people, talk to people." (P14)*

It was also suggested that these programmes should have a supportive and welcoming ethos rather than employing an impersonal approach:

> *"See, I think that's quite important though with the gardening and social side. I think if it was just a faceless person that you rang and they said, 'Right, here's your plot number' and you just paid your money and you know – there wasn't that kind of people, people there welcoming you and things, I don't think I'd like that. I think I'd prefer that erm human touch." (P7)*

Volunteering and mentoring

The importance of having sufficient volunteers was mentioned regularly as being one of the main influences on whether or not a community gardening programme would flourish. This included having someone to take on a coordinating role, as well as others to help with the more hands-on aspects of the programme:

"You need that core don't you, really. One's a co-ordinator, but you'll need a core of volunteers. Erm, you know, the ones who are obviously really salt-of-the-earth, that give up their time and effort." (P11)

The idea of having someone involved who would be able to provide advice and guidance based on personal experience, in a type of mentoring role, was discussed at length:

"The good thing about an allotment in my mind is that there's lots of old people there who've done this for years. And any of the ones I've come into contact with have always been dead keen and would give you some advice rightly or wrongly. They have all that knowledge that you can tap into." (P3)

Intergenerational issues

Linked to the point made above about mentoring, some participants felt that aiming to involve people from different age groups would be a positive goal of any programme. The older generation were perceived to have a lot of knowledge and experience to offer younger participants:

"They impart knowledge on everyone because all the other old people already know it all and suddenly they've got these young people who haven't got a clue what they're doing and, you know, they get to help them." (P16)

However, there were mixed views about bringing together younger and older people, as it was felt that having a wide age gap could put some people off wanting to take part:

> *"It could be quite intimidating for like a young person who was willing to take their young kids along. If it's just like a group of old men that were already there, they're not very sort of particularly very welcoming or, you know, friendly, you know. That would definitely put someone off I think." (P5)*

One participant put forward a suggestion to overcome this barrier that involved offering activities for children and hoping that their enthusiasm for gardening might motivate other family members to get involved:

> *"I think often there is kind of a lot of ill-feeling and prejudice between sort of the older generation and the younger generation […] So maybe things like, what we traditionally do are kind of kids activities, running a Saturday club once a month, so that you're encouraging the kid in the right way and they're saying, 'Well, look mam and dad, I actually want to do this. Let's get a plot for ourselves'." (P9)*

4.6 Discussion

Study One set out to explore the needs and attitudes of people living in socio-economically disadvantaged areas in relation to engaging in community gardening. No previously published research has attempted to identify and incorporate issues that are important to local communities when

it comes to designing community gardening programmes. This is in spite of literature recognising the potential value of employing community-based participatory research (CBPR) in the development, implementation and evaluation of these types of programmes (Zoellner *et al.*, 2012).This aligns with the 'Asset Based Community Development' (ABCD) approach, which suggests that there are significant benefits when local people are involved directly in promoting their own health (Greetham, 2011).

By working together with communities, it may be possible to deliver services which are more translational into real world practice (Minkler and Wallerstein, 2011; Cooke *et al*., 2015). Although research into community involvement varies in content and quality, it has been suggested that the involvement of stakeholders may improve the relevance of research questions, increase the transparency of research activities and accelerate the adoption of research into practice (Concannon *et al.*, 2014). By drawing on insights from local community members in this study, it can be argued that the end result is a more meaningful and beneficial public health intervention for those communities.

Three main themes emerged from the focus group discussions. These were: 1) Physical features of community gardening sites; 2) Practical barriers and facilitators to accessing community gardening programmes; and 3) Social factors impacting on uptake and retention.

4.6.1 Physical features of community gardening sites

Support for the findings in Study One with regard to physical features is limited. Physical features such as the size of a gardening plot have been

discussed in previous research. McVeigh (2015) found that, not only is space for community gardening difficult to come by, the space that is available is often overgrown and rundown, putting off potential new tenants.

4.6.2 Practical barriers and facilitators to accessing community gardening programmes

This study also highlights the existence of a number of barriers facing individuals who might be keen to try gardening. Being able to get to and from the community garden was reported as a barrier in Study One. This finding is supported by Crow (2009), who studied the issues that community gardeners needed to overcome in order to implement a community gardening scheme, and one of these issues was the location choice of the community garden, i.e. is it accessible for all. In addition to the location problem, the acquisition of the land for the community garden was also a hurdle to overcome.

The findings in this study have also been supported by Bristol City Council's recent evaluation, 'Growing Support in the Community' (2016). This explored community gardening for those with dementia and found that the very nature of working outdoors on an open site, with physical characteristics such as uneven paths, no access to toilet facilities, and having to work with tools was creating a barrier to participation. In addition, those who were classed as having mobility issues found transport to the venue difficult (Bristol City Council, 2016). The evaluation also suggested that weather was one of the main barriers to participation, especially for those who were less able-bodied. The suggestions raised to counteract this barrier included developing indoor activities either in poly tunnels if available, or a nearby community centre.

The lack of money for individuals to spend on engaging in a community gardening programme was highlighted as a potential barrier to taking part in any future intervention. To the best of my knowledge, there is no community gardening specific research that supports this, however, research into leisure-time physical activity engagement supports this finding (Reichart *et al.,* 2007). In a population-based study in Brazil, 3100 people were interviewed about their physical activity levels. The most frequently reported barrier to achieving 150 minutes per week of leisure-time physical activity was money (40.3 %). In spite of the well recognised benefits of physical activity, which community gardening can contribute towards, the notion that an individual's financial position can contribute towards increasing physical activity inequality is worrying.

This study also identified potential facilitators that include being flexible in how plots are used and providing storage facilities. Another facilitator identified was to continually promote local community gardening schemes. These findings support the work of McCann *et al.,* (2013) who identified that recruitment into public health interventions required 'face-to-face' contact, printed materials and extensive use of other media. Increasing uptake and retention of interventions remains an under-researched topic in public health.

4.6.3 Social factors impacting on uptake and retention

Study One supports findings from a survey by the older people's charity Anchor, which investigated the disengagement between older and younger generations (Anchor, 2014). Although their research found that there was a disconnect, they also found that 78 % of older people wanted to share advice with the younger generation. The findings of the present study suggest that,

although intergenerational gap issues exist, community gardening might provide a platform for the reconnection between generations. Carney *et al.,* (2012) argued that a community garden could strengthen family relationships and improve the dynamics between younger and older generations.

The present study highlighted the potential for community gardening programmes to provide valuable opportunities for social interaction, which is an area that has been explored in previous research. Milligan (2013) found that one of the most significant elements in a garden project was the development of a peer group. Working communally, sharing knowledge and skills, and increased social interaction were all seen as benefits. In addition, previous research has suggested that gardening allows for the opportunity to increase competence, empower the gardener and create a link to other support and resources in a local community (Milligan, 2004).

4.6.4 Strengths of Study One

A key strength of Study One was the heterogeneity of the sample in terms of age and gender, which enabled a broad range of perceptions and views to be discussed within the focus groups. However, the relatively small sample size makes it difficult to generalise the findings outside of the communities within County Durham, Northern England, where the study took place. The needs of communities in other areas may be different but, with careful planning, the development of the community gardening intervention, *'Nourishing Neighbourhoods'*, utilised these findings in considering potential barriers and facilitators to uptake and retention. Furthermore, Study One demonstrated the feasibility and value of carrying out pre-intervention

exploratory research to examine community needs, attitudes and expectations in relation to community gardening.

Another strength of this study was the ability to recruit participants into the action research process. This was potentially facilitated by the reputation that Groundwork North East has in County Durham, as it is a well-known organisation, and therefore perceived to be trustworthy. It was evident that there was an interest in the idea of developing a community gardening scheme in each of the locations, which gave me confidence that I would be able to recruit participants into the main intervention, *'Nourishing Neighbourhoods'*. In addition, I was already known to some of the participants before the focus groups, through delivering community projects. This may have been a contributing factor to why some participants agreed to take part, because they knew who I was and trusted me. However, this could potentially be seen as a limitation and is discussed as such in the next section.

4.6.5 Limitations of Study One

Research has shown that there are three main motivating factors for research participation: 1) altruism, 2) the participant is interested in the topic and 3) egoistic reasons such as money (Couper *et al.,* 2008). Groves, Singer and Corning (2000) developed the 'leverage-salience theory' to explain survey nonresponse and to describe the decisions individuals make to participate in survey research, as well as identifying strategies for researchers to counter nonrepsonse. Although this theory relates to survey responses, there is scope to transfer this knowledge to other data collection fields. Using this theory, I countered potential missing motivating factors

(altruism and being interested in the topic of community gardening) with an egoistic reason to take part, i.e. something with monetary value. Therefore, an incentive was used to encourage community members to take part in the focus groups. In this particular study, the incentive was a £10 gift voucher.

It may be viewed as a limitation to this piece of research that an incentive was used to help recruit participants. Monetary incentives are often used to facilitate recruitment and participation (Church, 1993; Singer, 2002). The use of incentives is a controversial topic within research due to the strain it puts on the researchers ethical position. Following on from the 1947 Nuremberg Code, Alderson and Morrow (2004) stated that no persuasion or pressure should be placed on any participant. The topic under debate is whether a monetary incentive can be classed as coercive (Singer and Couper, 2008), causing a participant to take part in risky behaviour that they would have not undertaken if it was not for the incentive being offered.

Another concern raised is whether or not financially disadvantaged groups are seen as more vulnerable to being pressured into taking part in research if there is a financial reward. To ensure that the balance was maintained between encouraging participation and research integrity, I attempted to put a value on the voucher which I felt was reasonable and proportionate to the time required for participants to take part, therefore recognising their commitment and effort to participate. In addition, the value was not so high that financially vulnerable individuals felt coerced into taking part. I also made sure participants were informed that they were free to withdraw from the focus group at any time once it had started, without it affecting them receiving the £10 gift voucher.

A final potential limitation with the focus groups was that some of the participants knew each other; some were family members, and some were friends. In small communities with low populations, it can be difficult to run such a research project with participants unknown to each other. This may have had an impact on what information was shared within the focus groups. The issue of working within a small community also meant that my role of working for Groundwork North East meant I was sometimes a familiar face. I need to be mindful that this may have had an effect on the data collected within the focus groups, as participants may have felt pressure to say things that they believed I wanted to hear.

4.6.3 Outputs to be considered when developing the intervention

This focus group study set out to identify factors that would increase the success and sustainability of a community gardening intervention. A number of themes and sub-themes were developed, relating to physical aspects of the garden, practical barriers and facilitators to engagement, and key social elements of gardening programmes. These findings are supported by published literature on 'green exercise', highlighting the potential value of community gardens in providing opportunities for social interaction, strengthening family relationships and increasing competence, as well as enhancing health and wellbeing. The findings from Study One informed the development of a tailored community gardening intervention called '*Nourishing Neighbourhoods',* in County Durham, Northern England. The evaluation of this intervention is described in chapters six and seven and

could also be used in designing similar interventions in other parts of the country.

It was clear from the three focus groups that the participants were in support of a community gardening programme, if it was set up and delivered in a way that was appropriate for their community. Based on the findings of this study, the development of the community gardening intervention delivered in Study Two and Three, '*Nourishing Neighbourhoods'*, needed to take a number of factors into account to ensure that barriers to initial and on-going engagement were removed or reduced as far as possible. These included the size and layout of the gardening plot, access to the site, security arrangements, and available facilities. Participants also suggested ways to maximise the accessibility and attractiveness of community gardening schemes, such as flexibility in how the gardens are used and various mechanisms employed for information-sharing. Sub-themes relating to social interaction and mentoring highlighted the necessity to incorporate a strong social aspect into '*Nourishing Neighbourhoods'*. The role of the volunteer was seen as also being crucial to the success and sustainability of the intervention. These suggestions were incorporated into an action plan and informed the design of a community gardening intervention called '*Nourishing Neighbourhoods'*. The development of this intervention and the action plan from Study One are described in detail in the following chapter.

CHAPTER FIVE: INTERVENTION DEVELOPMENT; NOURISHING NEIGHBOURHOODS

5.1 Introduction

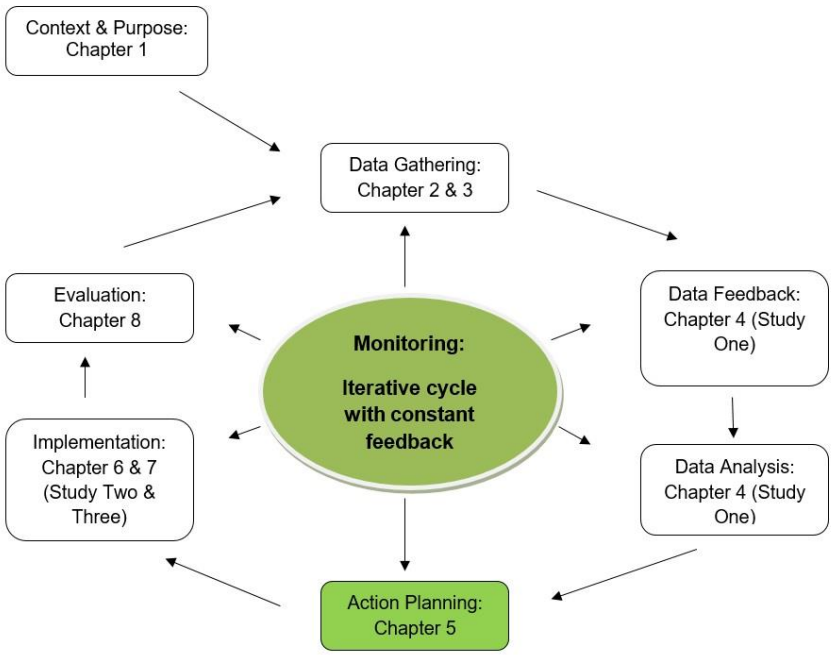
Drawing on the evidence discussed and presented in chapters three and four, this chapter will examine the factors which were considered when designing the complex health intervention; '*Nourishing Neighbourhoods'*. Interventions should be both theoretically-informed and evidence-based in order to ensure that the best is being done for the individuals we are attempting to support (NICE, 2007). This requires an evidence-based approach to intervention development. One of the issues that was encountered when developing the intervention was the lack of Evidence Based Practice (EBP) within community gardening programmes. This argument was recently supported by The Kings Fund report, Gardens and Health (Buck, 2016) which highlighted that evidence is available, but that it has not yet started to work its way into practice.

Chapter two demonstrated that there are variations in terms of how community gardening/ green exercise interventions have been described, particularly in relation to the theoretical underpinning and intervention methods used. Consequently, a framework for intervention development is required that promotes a standardised approach to the development and reporting of interventions. One such approach is utilising action research to help inform and develop an intervention (Kindon *et al.*, 2007). The framework for '*Nourishing Neighbourhoods'* is based around an action research approach, whilst also linking into the Medical Research Councils complex intervention framework (2000, 2008), and then utilising the TIDieR checklist,

developed by Hoffman *et al.,* (2014) which will be discussed later in this chapter.

This chapter intersperses the theory and evidence base underpinning the *'Nourishing Neighbourhoods'* programme with details of the process for the development of the programme. A description of *'Nourishing Neighbourhoods'* is then given. This chapter sits within the action planning phase of an iterative action research study, seen in Figure 5.1.

Figure 5.1: The Action Research Cycle; Where the intervention development sits within the thesis



5.2 Context for the Intervention

The national context in which the intervention is embedded has been covered in the literature review in chapter two. Recently, The Kings Fund produced a report entitled 'Gardens and health: Implications for policy and practice'. This report emphasises the need to explore the impact of gardens

and gardening on health and wellbeing, as well as explore what the NHS and the wider health and social care system can do to maximise this impact (Buck, 2016).

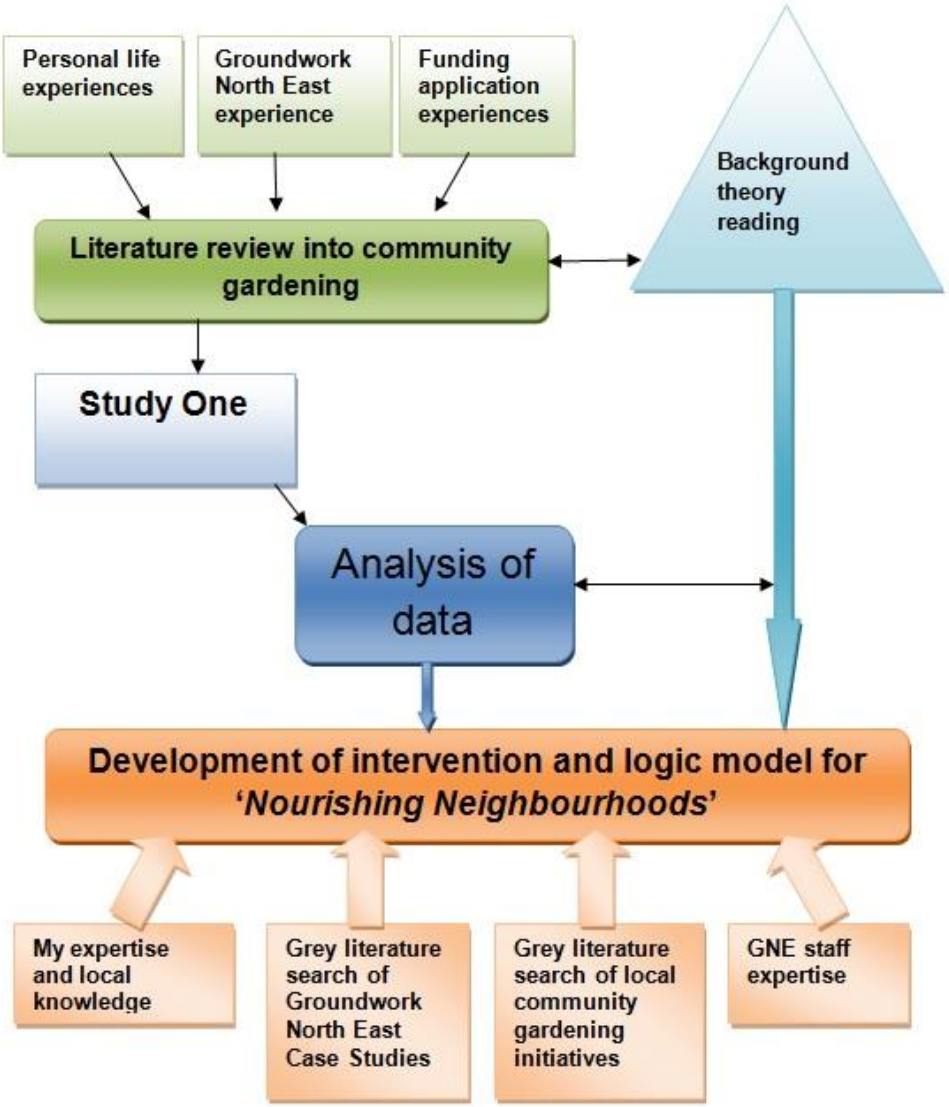
A priority was to integrate existing knowledge around gardening and health improvement into policy and practice at three levels:

- at the strategic policy level
- at the local level
- at the level of implementing and developing the evidence base

'*Nourishing Neighbourhoods'* sits at the lowest level, '*implementing and developing the evidence base*'. With current research 'varied in nature and in the strength of its study design' (Buck, 2016), the recommendation is to disseminate evidence that decision-makers can act upon, including methodologies such as case studies, observational and qualitative rather than being restricted to RCT's. In addition, The Kings Fund suggested that there should be a focus on economic evaluation. Although this thesis does not cover a full scale cost benefit analysis, there is a section within chapter six that presents the costs of delivering the intervention as a third sector worker, with a discussion on this topic in chapter eight.

To help the reader gain an understanding of the how the intervention has been developed, Figure 5.2 has been created to give a visual image of the various components that have come together to help co-create *'Nourishing Neighbourhoods'.* Each component will be described in further detail throughout this chapter.

Figure 5.2: The components involved with the development of 'Nourishing Neighbourhoods'



5.3 Personal experiences; working at Groundwork North East delivering projects; and a gap in the evidence base

In 2009, after looking into research on community gardens for a number of funding applications, I realised that there wasn't a vast amount of evidence to support the notion that community gardening was beneficial to health. The charity that I was working for at the time, Groundwork North East, had

carried out hundreds of gardening projects in the North East. I was carrying out these projects, and seeing anecdotal evidence of numerous health benefits. There was (and still is) a need and demand for community gardens. The benefits seemed obvious to me, but there was not the scientific evidence to fully support this idea. During a period when the NHS was undergoing major reforms to help reduce the cost of reducing health inequalities and tackling obesity, I felt that the research topic was timely. Community gardens, I felt, had the potential to provide a cost effective way for the NHS, and local Clinical Commissioning Groups (CCG's) to tackle not only physical health problems, but also mental health problems too. Most importantly, I felt that if implemented into communities, the lifestyle that community gardening promotes- an active, healthy one- could be instilled from school age, rather than being used as an intervention to tackle health problems in the older population.

5.4 Background Reading: Part I

At this stage in the research process, a very basic search was carried out to explore what community gardening evidence looked like at first glance. It was apparent that although there was literature on the subject, it spanned a number of topics, with very little evidence for community gardening, especially in the UK. In addition, I was not able to find a great deal of research where studies outlined how a community gardening intervention had been developed. My supervisory team supported my decision to gather some preliminary data to help explore the topic of community gardening, with

a view to refining the thesis question. This exploratory work would involve focus groups and is referred to as Study One in this thesis.

5.5 Study One: Informing a Health Intervention through Action Research

Chapter four described in detail the level of community involvement in developing '*Nourishing Neighbourhoods'* through action research. The setting involved three locations in County Durham, England, which were characterised by socio-economic disadvantage and health inequalities. Focus groups were carried out to uncover attitudes, opinions and beliefs towards a 'green exercise' programme in the form of community gardening.

Following on from the themes identified in Study One, an action plan for the development of '*Nourishing Neighbourhoods*' was established (Appendix M). The action plan incorporated the findings from the study alongside evidence highlighting the importance of ensuring community-based interventions are developed with local people right from the beginning. The action plan that was developed was an integral part of developing '*Nourishing Neighbourhoods'*. Figure 5.3 identifies a number of the suggestions that came from local people through the action research process. Ensuring that these suggestions were factored into the intervention development was important to help foster a sense of ownership.

Figure 5.3: Action research findings from Study One used to inform intervention development

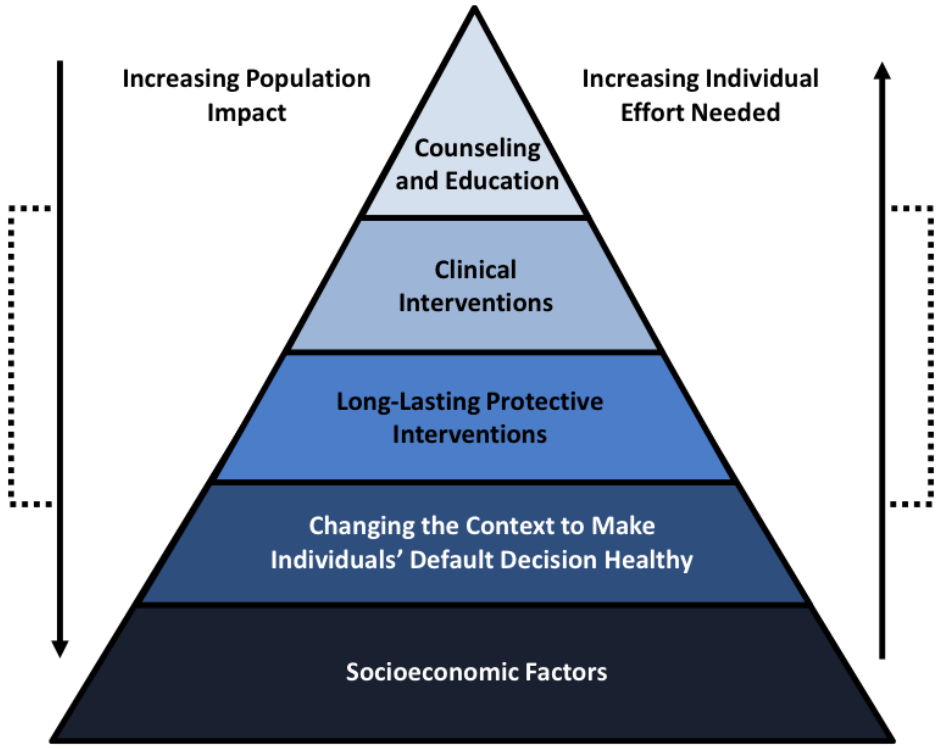
On a practical level, I tried to incorporate what was feasible into the intervention, such as selecting sites that were central; ensuring that sites could be locked up; making sure there was a water source. However, there were some suggestions that I could not action from the outset, simply because they were out of my control. For example, I could not be sure that there were participants with extensive gardening experience who would engage with the project. It was purely down to chance if local people with the background came forward, and were also happy to take on a role of being a peer mentor during the six month programme. The implementation of the findings from Study One into *'Nourishing Neighbourhoods*' are discussed in greater detail further on in this chapter.

5.6 Background reading: Part II

5.6.1 Intervention Development

Interventions focus on people's behaviours, and how changes in the environment can support those behaviours. Public health interventions are intended to promote or protect health, or prevent ill health, in communities or populations. They are distinguished from clinical interventions, which are intended to prevent or treat illness in individuals (Rychetnik *et al.*, 2002). There are various levels at which interventions can be targeted, which Figure 5.4 highlights and can range from those targeted at the individual level to interventions aimed at policy level. The 5-tier Health Impact Pyramid identifies the different types of interventions. The pyramid describes the impact of different types of public health interventions and provides a framework to improve health. Efforts to address socioeconomic determinants are at the base, followed by public health interventions that change the context for health (e.g., clean water, safe roads), protective interventions with long-term benefits (e.g., immunisations) direct clinical care, and, at the top, counseling and education. Frieden (2010) argued that interventions focusing on the lower levels of the pyramid are more effective because they reach broader segments of society and require less individual effort. However, it can be argued that implementing interventions at each of the levels can achieve public health benefits.

Figure 5.4 Types of interventions. Adapted from Frieden, T.R. (2010). American Journal of Public Health (100) page 590-595.



Social intervention theorists have suggested that the social order of society is made up of increasingly complex levels of organisation (Rappaport, 1977). With this in mind, it can be argued that health promotion interventions may be focused on individual action, the physical and social organisation of settings, and broader societal and institutional processes (Swerissen *et al*., 2001). There are many advantages to using public health interventions as a means to achieve positive health outcomes. By designing and implementing interventions in a clear, systematic manner, the health and well-being of a community can be improved (Fawcett *et al.*, 2013).

5.6.2 Key Factors for Intervention Development

In recent years, there has been an increase in research attempting to identify the factors needed when developing an intervention. Fawcett *et al.,* (2013)

identified steps that must take place to develop a robust and well thought out intervention. Important issues such as identifying measurement tools (observations, surveys, interviews); who the intervention will help (targeted or whole population); looking at previous 'best practice' (local, national, international); brainstorming ideas based on own experiences; identifying barriers and how to overcome them; and finally, developing an action plan to carry out the intervention. Additionally, a recent paper by Wight *et al.,* (2015) identified six steps to deliver a quality intervention (6SquID). These steps are outlined in box 5.1:

Box 5.1: Main steps in public health intervention development, Wight et al., 2015

1. Define and understand the problem and its causes.
2. Clarify which causal or contextual factors are malleable and have greatest scope for change.
3. Identify how to bring about change: the change mechanism.
4. Identify how to deliver the change mechanism.
5. Test and refine on a small scale.
6. Collect sufficient evidence of effectiveness to justify rigorous evaluation/implementation.

Before any intervention could be developed , it was important to go back to step one in the 6SQuiD process (Wight *et al*., 2015) to try and understand the problem, which delves into the theoretical underpinning that has supported any previous literature in the field in question.

5.6.3 Theoretical Underpinning

An important part of developing an intervention, and a complex health intervention at that, is to explore the potential for a theoretical underpinning which can help to guide the informing and development of an intervention which is trying to change an individuals or a community's behaviour. A

review took place of various theories which could have potentially underpinned the intervention. However, no single theory stood out as the theory that would drive any development forward. For example, current thinking by Daniel Kahneman has changed the way we think about human behaviour, highlighting the importance of the automatic motivation system (Kahneman, 2011). The application of this concept has been popularised by, among others, behavioural economists Richard Thaler and Cass Sunstein through their influential book “Nudge: Improving Decisions about Health, Wealth and Happiness” (Thaler and Sunstein, 2009). Certainly, I could identify particular aspects of such theories that had the potential to give the intervention an acceptable underpinning with which I could rationalise my choices, but it was apparent that other aspects would fall short, therefore undermining that particular theory as my rationale and justification.

‘Nourishing Neighbourhoods’ differs from other community gardening interventions outlined in chapter two, in that it offers a greater emphasis on the community being able to drive the intervention before and during the programme, in that there is a flexibility in how it is delivered. The understanding of how ‘*Nourishing Neighbourhoods’* was developed only occurred through personal reflection towards the end of the actual delivery period. The design of the programme was not fully immersed in a specific theory of behavioural change. The process took a much more organic and natural course, utilising a variety of sources, and ultimately drawing on the action research (Brydon- Miller *et al.*, 2003) carried out in Study One.

5.6.4 Evidence Based Practice and Practice Based Evidence

Evidence-based practice refers to applying the best available research evidence in the provision of health, behaviour, and education services to enhance outcomes (Metz *et al.,* 2007). Evidence-based practice (EBP) originated in the medical field, and it is often based on randomised controlled trials that have been conducted. However, it has been extremely difficult to incorporate many of these findings into direct practice with people. More recently, disciplines such as psychology and education have embraced the evidence-based practice movement in an effort to build quality and accountability. As argued previously in chapter three by Evans *et al.,* (2003), there is now an appreciation of alternative sources of data that previously were considered unworthy of inclusion.

One of the issues that was encountered when developing the intervention was the lack of EBP within community gardening programmes. This argument was recently supported by The Kings Fund report, Gardens and Health (Buck, 2016) which highlighted that evidence is available, but that it has not yet started to work its way into practice. As asked by Lawrence Green (2008), “if it is an evidence-based practice, where's the practice-based evidence”? Green argued that the gap between science and practice fell on the shoulders of both researchers and practitioners, and that despite the work of government agencies and university research centres attempting to translate and disseminate, there was still a long way to go to address the gap.

Green (2008) suggested that one of the steps to take to increase the evidence base was to bring the research closer to the actual circumstances

of practice, variously in the form of action research and participatory research. The argument for this was that results would be *'more relevant, more actionable, more tailored, more particular to their patients or populations and to their circumstances of practice and with more immediate feedback to the practitioners themselves'* (Green, 2008, p 23). The promise of this approach has led to the suggestion that if we want more evidence-based practice, we need more practice-based evidence (Green and Ottoson, 2004).

Practice Based Evidence (PBE) is an innovative prospective research design that uses data gathered from current practice to identify what processes work in the real world (Nelson and Staggers, 2017). EBP uses evidence to guide practice, wheras PBE is about obtaining evidence from practice. Nelson and Staggers (2017) argued that the inclusion of frontline staff and participants in the design, execution and analysis of studies and their data would help to improve ecological validity within research findings. PBE sits nicely within this thesis framework, as it is guided by participatory research (Nelson and Staggers, 2017).

PBE is defined as having an observational design. Nelson and Staggers (2017) argued that the evidence for causation should be viewed as a continuum that runs from association to undeniable causation. The observational study can chip away at potential confounders, moving up the continuum from association to causation. PBE can give a methodology to be able to move up this continuum. PBE designs trade away the internal validity (the intervention is the true cause of the outcome) of RCTS, for external validity (being able to generalise across different settings). PBE has high

external validity as it involves working with all kinds of people, settings and variables. It allows the researcher to observe complex designs without the need to develop a robust RCT which would ultimately remove the very variables we want to explore in a natural setting.

It can be argued, with hindsight, that the development of *'Nourishing Neighbourhoods'* utilised PBE, as it was not developed in a clinical setting, but closely with community members and practitioners. And as the 24 week programme ran, it continued to develop through the input of participants helping to guide delivery on each of the four sites.

5.6 My Previous Experience and Expertise

Throughout my career at Groundwork North East, I was able to build up a portfolio of varying experiences, expertise, knowledge and qualifications. This portfolio related to working with people of all ages, across a spectrum of socio economic statuses. It is only with hindsight that I can fully appreciate that this experience cannot be linked to a theory to help underpin the development of an intervention. It is purely based on living through similar intervention processes day in and day out. Finding out what works for certain communities, for certain individuals, as well as developing a better understanding of logistical problems and resource implications.

As part of my training over my Groundwork North East career, I gained qualifications to deliver Forest Schools projects and basic horticulture delivery. I gained my PTLLS certificate (Preparing to Teach in the Life Long Learning Sector), which enabled me to be able to plan and deliver sessions. Mandatory training such as first aid, and understanding risk assessments

also had relevance to the development process. One of the most important skills I developed was the ability to communicate with members of the public and local communities. From residents, to local councillors, to business owners. This ability to communicate and build rapport with people enables networks of trust to develop. This trust is, I believe, paramount for any community based intervention that involves stakeholders from differing backgrounds.

5.7 Grey Literature Searches

A grey literature search can help both researchers and practitioners identify what interventions are already in existence for a particular problem (Adams *et al.,* 2016). I decided that the first search should take place using the server of Groundwork North East, where information on previous projects, including community gardening projects, is stored. I also ran a search for community gardening interventions using www.google.com. However, this method has problems of replicating results, as the results that are offered after entering key words are based on recent popularity (Mahood *et al.,* 2014).

5.7.1 Exploration within Groundwork North East Data

As part of my role at Groundwork North East, it was a requirement to write up case studies following on from the completion of projects. These were used as evidence for funding bodies to showcase what we had achieved, in a brief one-page format. A more in-depth case study would include project plans; financial budgets, internal evaluations of differing standards (depending on the project value, ranging from bronze – under £50k, to gold- over £100k), and feedback from stakeholders involved with the project.

As part of the development of '*Nourishing Neighbourhoods',* I spent time looking through the archives of not only the projects that I had carried out during my six years at the charity, but at projects spanning the charities thirty-year existence. I used key words such as 'garden', 'allotment', 'health', 'green' and 'community' when searching the archive database. Where I came across projects that had provided exemplary work and case studies, I spent time looking through evaluations to try and pinpoint what had make that particular project a success. I created an excel database of previous community gardening projects at Groundwork with the following headers: location, size, resources, key community contacts, length of programme, budget spent, number of participants. I also included a hyperlink to any session plans that had been stored on the server. This was a selective grey literature search that was used to help develop my knowledge and understanding of community gardening projects in the North East of England.

5.7.2 Exploration at a National and Local Level

Using www.google.com, I carried out a grey literature search using key words. I also looked at national government, local authority and charity websites for information on local community gardening interventions.

5.8 Groundwork North East Staff Expertise

Utilising the staff expertise at Groundwork North East was a critical part of the development. If I was unsure of any elements, I would find out which project officer had worked on a particular gardening project (if they were still a member of staff at Groundwork North East) to clarify any missing points, and to ask their advice on developing a project such as '*Nourishing*

Neighbourhoods'. This would provide useful insider information which was critical for local success. One downside to making use of local expertise is that evidence that has been collated and shared on an international stage is often based outside of this region and it isn't clear how well it would apply in a local context. However, whilst not as robust as other forms of evidence, local evidence and experience is 100% applicable and therefore forms a legitimate addition to the scientific evidence base. Figure 5.5 gives a snapshot of what local evidence looks like. In this scenario; a brief case study.

Figure 5.5: Examples of Groundwork North East Case Studies

5.9 Background Reading: Part III

5.9.1 Reporting of an Intervention

High on the current research agenda in public health is the evaluation of interventions, yet the quality of intervention descriptions in publications is an

area that needs considerable improvement (Hoffman *et al.*, 2014). Without a complete published description of the intervention, other researchers cannot replicate or build on research findings. Intervention description involves more than providing a label or the ingredients list. Key features—including duration, mode of delivery and essential processes, can all influence efficacy and replicability but are often missing or poorly described. For complex interventions, this detail is needed for each component of the intervention (Hoffman *et al.*, 2014).

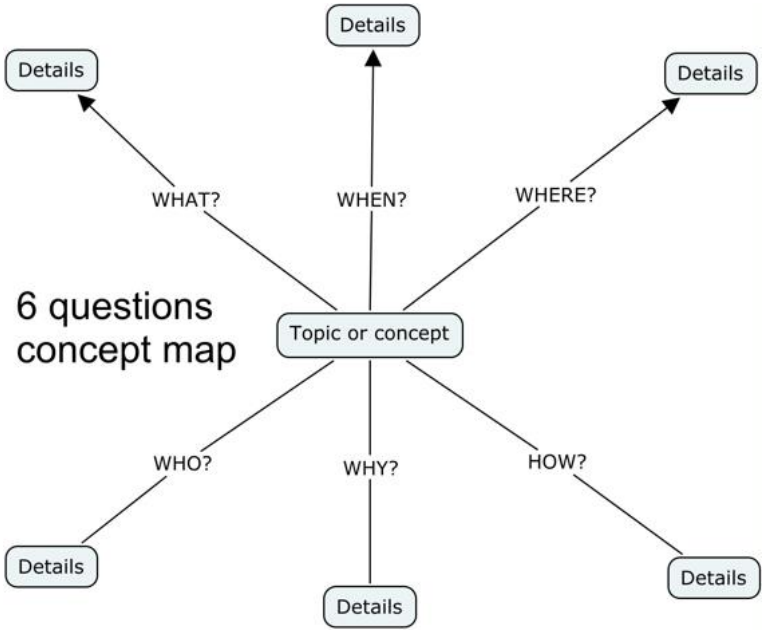
Following on from this initial critique, Hoffman *et al.,* (2014) developed a method to ensure that intervention descriptions could achieve a higher quality. This development was of a checklist; the 'Template for Intervention Description and Replication' (TIDieR). The checklist called upon the work of a famous author, who had written a poem which highlighted the key concepts of critical thinking:

"I keep six honest serving- men
(They taught me all I knew);
Their names are
What and Why and When and
How and Where and Who"

Rudyard Kipling, The Elephants Child (1900).

This poem has been used by advocates of critical thinking, in exploring 'what do we need to ask'? The critical thinking agenda has been developed into a conceptual map (see Figure 5. 6), which Hoffman *et al.,* (2014) used when developing their TIDieR checklist.

Figure 5.6: The six questions to trigger critical thinking. Taken from Aveyard, Sharp & Woolliams 2011; adapted from Woolliams et al., 2009.



5.9.2 TIDieR

Inadequate reporting of interventions can limit the interpretation of study findings and the translation of research evidence into practice. Previous work has highlighted deficiencies in the reporting of a range of non-pharmacological interventions in published trials (Hoffman *et al.*, 2013). Following on from this, Hoffman *et al.,* (2014) developed the checklist 'TIDier'. This checklist provides a structure for assessing the completeness of intervention descriptions. Tew *et al.,* (2016) described the checklist in detail whilst carrying out a review of RCTs of supervised exercise training in people with peripheral arterial disease. Figure 5.7 shows the 12 items on the 'TIDieR' checklist.

Figure 5.7: Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. Taken from Tew et al., (2016). Adapted from Hoffmann et al., (2014), page 348.

Item no.	Item name	Item description
1	Brief name	A name or a phrase which describes the intervention
2	Why	Describe the rationale, theory, or goal of the elements essential to the intervention
3	What: materials	Describe any physical or informational materials used in the intervention, including the make and model of exercise equipment and what materials were provided to participants or used in intervention delivery or in training of intervention providers
4	What: procedures	Describe each of the procedures, activities, and/or processes used in the intervention, including any enabling or support activities
5	Provider	Describes the intervention provider(s) and their expertise, background, and any specific training given
6	How	Describe whether the supervised exercise programme was delivered individually or in a group; if group, then state the maximum number of participants per session
7	Where	Describe the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features
8	When and how much	Describes the dose/schedule of the intervention including the following:
	(a) Intensity	The intensity of exercise used in the intervention (e.g., target severity of claudication pain during walking)
	(b) Frequency	The frequency of exercise sessions
	(c) Session time	The duration of each individual exercise session
	(d) Overall duration	The overall duration of the supervised exercise programme
9	Tailoring	If the intervention was planned to be personalised, titrated or adapted, then describe what, why, when and how
10	Modifications	Describes any modifications to the intervention during the course of the study
11	How well: planned	
	(a) fidelity strategies	Describe any strategies, besides direct supervision, which were used to maintain or improve intervention fidelity
	(b) fidelity assessment	Describe what procedures were used to assess intervention adherence or fidelity, e.g., exercise logbooks
12	How well: actual	Describe the extent to which the delivered intervention varied from the intended intervention, e.g., through the provision of data about how many exercise sessions were completed, and the duration and intensity of those sessions

doi:10.1371/journal.pone.0150869.t001

I felt the TIDieR checklist would give a robust framework to go back and reflect on the development process, in an attempt to identify the choices I had made throughout the thesis. I felt that a couple of the points within the checklist were not relevant to describing the intervention at this later stage in the thesis, as they have already been reported earlier in the chapters. These included:

- 1 (name- '*Nourishing Neighbourhoods*')

- 2 (why- the rationale and theory behind the intervention)

In addition, some of the points in the checklist are relevant to later chapters in the thesis, which will be addressed in the discussion. These include points:

- 10 (modifications);
- 11 (How well: planned)
- 12 (How well: actual)

I took the TIDieR checklist concept, and mapped out how each of these components that need clarification and description linked to any decision making sources. In addition, I added two components of my own: ‘recruitment’ and ‘user group’. Decision making sources that I identified post-delivery include: findings from Study One; staff expertise from Groundwork North East; case studies of previous projects at Groundwork North East; my own personal expertise as a practitioner; and finally, direction given from participants during the delivery of the intervention itself. A visual representation of this mapping exercise can be seen in Figure 5.8.

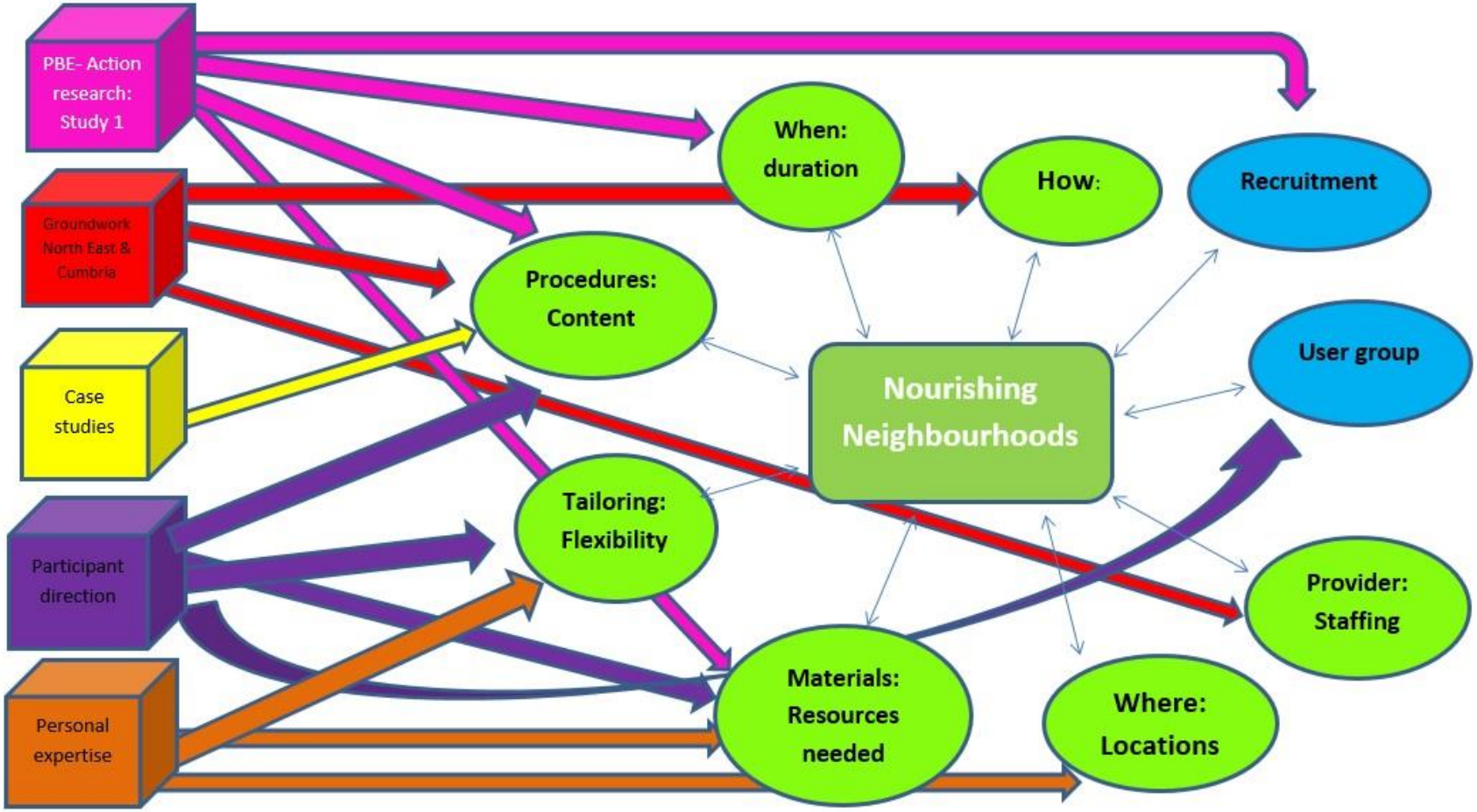


Figure 5.8: the visual representation of developing Nourishing Neighbourhoods, using the TIDieR principles

Following on from the development of Figure 5.8, options were established for each of the components. Each component needed thought around which option would be most suitable for the intervention. Sometimes the choice was made due to financial constraints. Other components relied on examining previous similar projects delivered by Groundwork North East to guide the development. On occasion, I had to make a decision based on my previous experiences and knowledge that I had accumulated as a practitioner. Later in the chapter, I outline the options that I had when deciding on each component of the intervention, and the chosen option. There were some components that were givens, i.e. there was no other option. Other components of the intervention were chosen due to evidence. The evidence used for each decision is also discussed. This overview of the decisions that were made in developing the intervention can aid with development transparency, and it is important to discuss each of those decisions in turn.

5.10 Mapping the Intervention Out

5.10.1 The Known Choices

Some decisions made on this journey were not through choice or best evidence, but based on practicalities, such as the sites that were used in the intervention. Various sites were explored throughout County Durham, but the sites that were selected were based on those that were available at the time the intervention was due to start, and also had landowner permission for use. No other form of evidence was used to select the sites for '*Nourishing Neighbourhoods'*.

Figure 5.9 shows the plot of land that was made available for the Ferryhill programme. As it evident from the picture, the site was not in great condition, and had a lot of clearance work needed at the start.

Figure 5.9: The Ferryhill site prior to 'Nourishing Neighbourhoods' commencing

Figure 5.10 shows two of the participants at Leeholme learning to use a strimmer as the clearance work started at the beginning of the intervention. As you can see, there is a big difference in the site condition between Ferryhill and Leeholme.

Figure 5.10: Leeholme site on day one of the 'Nourishing Neighbourhoods' programme

The site in Horden had a lot of waste that needed to be cleared at the beginning of the 'Nourishing Neighbourhoods' intervention (see Figure 5.11).

Figure 5.11: Horden site prior to 'Nourishing Neighbourhoods'

Figure 5.12 shows the site at '*The Hub'*, which is located in Barnard Castle. The gardening plot was located at the back of '*The Hub'*, and the picture shows the inside of the poly tunnel, prepared for the start of the intervention. Again, you can see the difference in site conditions between Horden and Barnard Castle, prior to the intervention starting.

Figure 5.12: Getting ready to start 'Nourishing Neighbourhoods' at 'The Hub'

5.10.2 The Unknown Choices

The sites were a known quantity in this study. However, there were a number of unknowns, which required an exploration of options, with decisions made that were based on evidence. Figure 5.13 highlights the various components, options and the chosen method, with the evidence behind the decision detailed on the following pages.

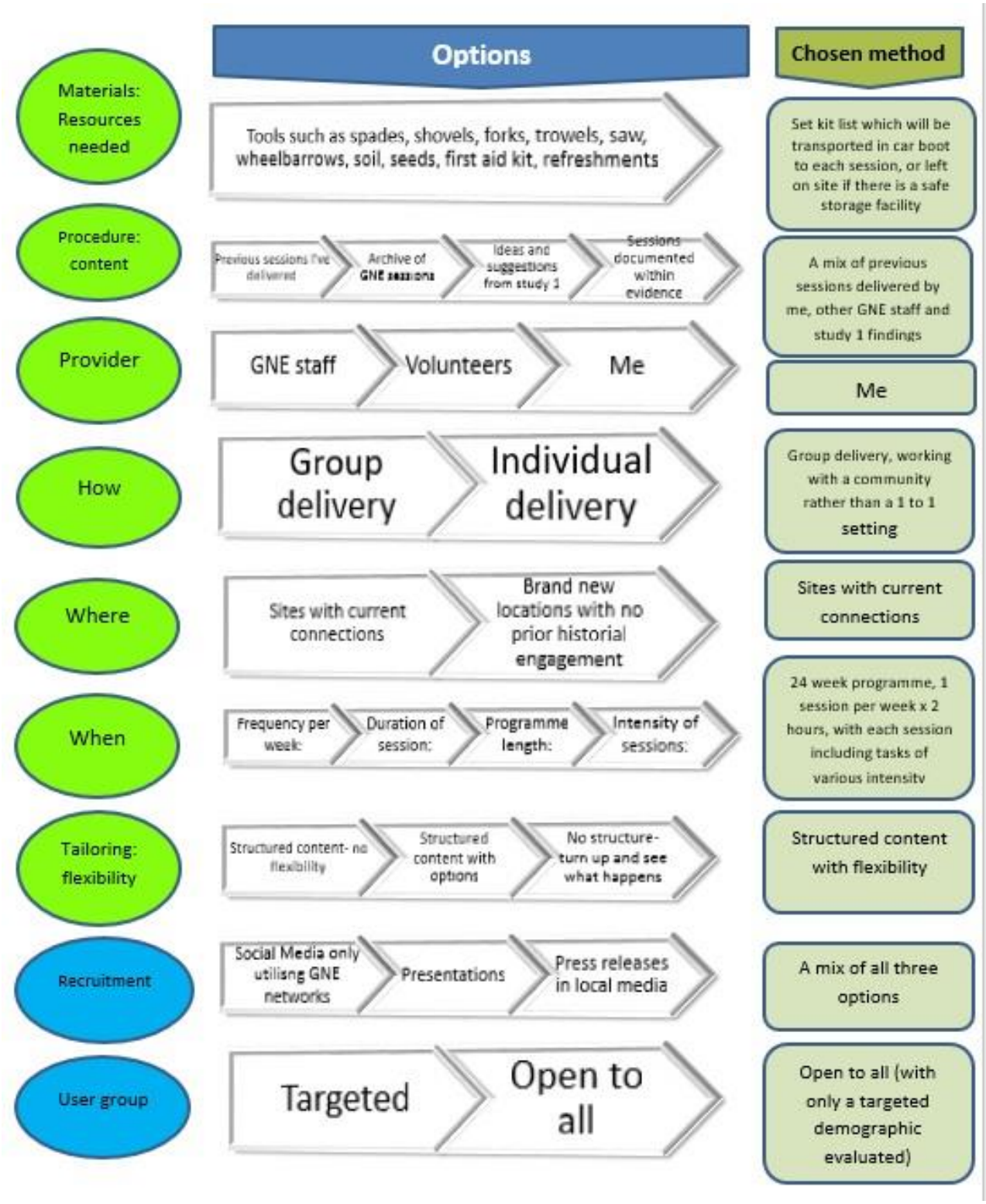


Figure 5.13: The components, options and chosen methods for 'Nourishing Neighbourhoods'

With regards to the '**materials'** that would be required for the programme, this did not really need exploration or research. This is something that is part and parcel of delivering similar projects at Groundwork North East. The basic items that are needed for a gardening project include tools, first aid kit, seeds and soil. Additional resources that I decided to include in the intervention based on findings from Study One were refreshments. This involved me pulling together a box which included cups, tea, coffee, sugar, milk, spoons and biscuits. Although I knew this was going to come at an additional cost to the project, one of the popular reasons given for attending such community interventions was the opportunity to socialise with other people and be able to sit and talk to new people. By providing refreshments, there is a natural opportunity for this social interaction and social development to take place.

Looking at the '**content'** of the 24 week programme required a mix of sources. I started off looking at similar projects I had delivered, albeit over shorter time periods. This was done using a mix of case studies and more in-depth research into project folders on the Groundwork North East server. I then looked beyond projects I had worked on, and carried out a search of projects within Groundwork North East that had possible links to gardening, green exercise and general health. I spoke to colleagues who had worked on projects, and not just gardening programmes. In addition, suggestions for programme content were drawn down from the findings in Study One. I had also decided that delivery across the four sites would be as flexible as was feasibly possible, so that throughout the 24 week programme, participants could have a say in what they wanted to work on, to help develop ownership of the site and to foster a collective group purpose.

Deciding on who would be the '**provider**' of the intervention was not something that was up for discussion (i.e. it was always going to be delivered by myself). However, a decision needed to be made as to what role I undertook to deliver the programme, purely due to financial restrictions. Groundwork North East did not have the financial capacity to pay my salary to deliver '*Nourishing Neighbourhoods'* when it was not linked to a project with finance attached. However, it was essential that the intervention was delivered as a Groundwork North East project to ensure that there was professional and public insurance in place. '*Nourishing Neighbourhoods'*, just like any community intervention, had potential risks attached to it. So for the safety of all participants and myself, insurance was essential.

After much deliberation, it was agreed that I would run the programme as a Groundwork North East volunteer, outside of my salaried hours. This ensured that we had the necessary insurances and policies in place; there were appropriate procedures to follow, such as risk assessments and lone working; there were marketing avenues that could be tapped into to advertise the intervention; and finally, local people could see the Groundwork North East logo and have trust in the fact that the programme was legitimate.

In relation to deciding on '**How**' the intervention would be run, the two options that previous gardening literature suggested was either as a one to one programme, or in a group setting. Again, for financial reasons, a one to one approach was not an option. The greatest driver for selecting group settings was the fact that the evaluation was based around community gardening, not gardening as an isolated activity.

When deciding **'Where'** the locations would be to deliver the intervention, I had to draw on my own personal experience. I knew that to select locations where I had had no prior engagement with communities would provide a problem. When starting as a project officer for a charity in a new geographical location, a large amount of time is required to build relationships, rapport and trust within that community. Time was not something I had to start relationships up from scratch, so I selected locations based on the relationships I had already built during my time with Groundwork North East, as well as speaking to colleagues. Colleagues were able to provide me with information of communities in their patch that had expressed an interest in developing a community garden, but just weren't sure how to set things up.

Deciding on the '**When'** parameters of the intervention, I used a mix of input from Study One, which included suggestions to be flexible to the needs of the community as best as possible, and the constraints that I had personally. As I was delivering on four sites at the same time, whilst working as a volunteer, I felt that one session a week would be the maximum I could provide. I decided on two hours of delivery, as I also had to factor in travel time to sites as well as preparation time on site before participants arrived. In addition to this, based on previous experience, any more than one session a week at the start of a project can feel like an overload for participants.

Listening to the views of local community members in Study One, it was important that each session had a variation of intensity so that people with varying abilities could take part. Not everyone would be capable of moving a heavy wheelbarrow around. Similarly, sitting down and weeding for a full

session would not be to everyone's tastes. So when devising session plans, I ensured that there were activity options for various levels.

It was clear from the findings in Study One that '**Tailoring'** the intervention to suit the participants would be the most effective approach. Through the focus group discussion, it was apparent that the appeal of community gardening differed, and that there was no 'one size fits all'. If I had decided that each site would follow a structured programme with no flexibility, it would have been difficult to collect data on the individual motivating factors for engagement. I also made this decision based on previous experience of working with communities in general. I have found that if there is no room for compromise, an audience is lost pretty quickly.

'**Recruiting**' to an intervention was a component that I felt was missing from the TIDieR checklist in relation to '*Nourishing Neighbourhoods'*. I feel that if this intervention was to be replicated, being able to identify how participants were recruited was essential. The options for marketing community interventions has changed remarkably over the past few years, with a move away from traditional methods such as posters and flyers, to utilising the power of social media. I decided that rather than going with only one approach, I would need to use a mix.

The reason for this was to not isolate any particular age group. Younger generations are more IT literate, and therefore potentially see opportunities via outlets such as Facebook and Twitter. Older generations may not always be up to speed with how social media works, and are perhaps more likely to see an article in a newspaper or a poster in their local library. Based on this

judgment that was supported by findings from Study One, it was important to market the '*Nourishing Neighbourhoods'* projects across a variety of marketing platforms.

Another component that I added into my checklist was to look at what '**User group'** would be involved in the intervention. There were a variety of demographic groups that could have been targeted, such as children and young people, adults, over 65s and families. After some consideration and discussion with my supervisors around the ethical challenges faced when collecting data from young people, I decided that the intervention would be open for all. I didn't want local people to feel excluded from the project. However, I decided I would only collect data from participants over the age of 18. Ultimately, the participants who would turn up each week would do that through their own choice, and I felt that that would be interesting enough in itself, to observe which demographic engaged with such a project without any targeted approach, as well as observing if there were differences between sites.

5.11 The Intervention: *'Nourishing Neighbourhoods'*

In terms of the components, at this point it is important to expand on one of the components identified in Figure 5.11, and that is of the 'Procedure', or actual content. *'Nourishing Neighbourhoods'* was a community gardening intervention focusing on improving individual wellbeing through an outdoor physical activity programme. The programme consisted of a 24-week group-based community programme involving a two hour session each week, comprising parallel sessions across four sites in County Durham. The

sessions combined the development and creation of a community growing site, as well as education on growing fruit and vegetables, maintenance of a garden, information around healthy eating and physical activity, and social time to foster new friendships. Box 5.2 summarises the main principles underpinning the *'Nourishing Neighbourhoods'* intervention.

Box 5.2- Principles underpinning the 'Nourishing Neighbourhoods' Programme

Development and Creation of Community Gardens
This part of the project will involve working with the community to actually create the gardening site. The delivery team will be available two hours a week to assist with the development, but ultimately, it will be the community who can actually get involved and complete the site. This will include selecting an appropriate area that is accessible for all, working on access improvements and fencing, as well as creating the growing areas.

Delivery of 'Nourishing Neighbourhoods' Sessions
The sessions will range from actual involvement to create the new gardening site in each community, right through to the harvesting of the produce that the community has grown themselves.

Groundwork personnel will deliver the intervention which will aim to:
a) Develop knowledge and understanding through first-hand experience of growing;
b) Raise awareness of food and where it comes from;
c) Develop underused land into an allotment for the whole community to use;
d) Encourage families to eat healthily when they can get their 'five a day' from their own allotment;
e) Increase physical activity levels (through digging, weeding, planting etc.); and
f) Improve mental wellbeing through socialising with other people, and by increasing confidence and raising self-esteem etc.

The intervention involved preparing and maintaining the allotment space, as well as participants learning how to grow and cook their own food to improve their physical and mental wellbeing. Sessions consisted of; preparing the allotment space, growing their own food throughout the year and cooking their produce, as well as education on where food comes from, food miles and seasonality. The intervention was designed to withstand the vagaries of the British weather. The main aspects of the programme were drawn from previous experience of similar programmes developed and delivered by Groundwork North East. Table 5.1 outlines the content of the sessions for the 24 weeks. Each week all four sites had a themed session plan with learning aims and objectives. However, these were flexible and open to change through discussion with the group working on any particular site.

Table 5.1 – Proposed sequence and content of 'Nourishing Neighbourhoods'

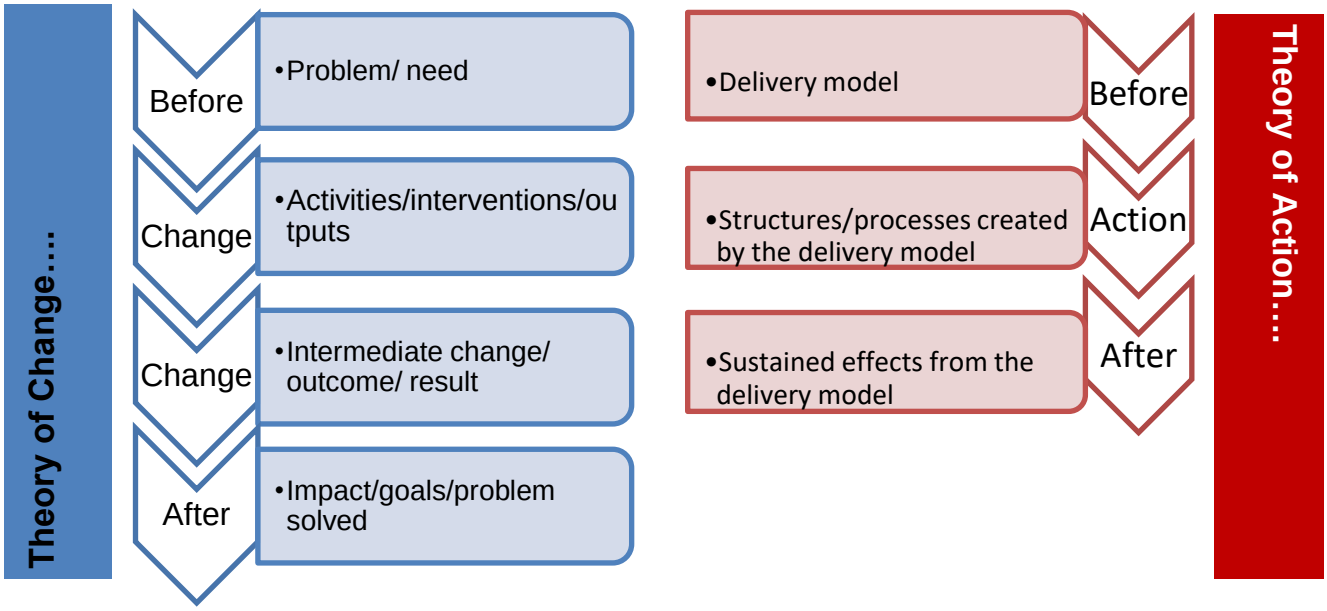
Month/Week	Session Key Point/s	Activities
July	Preparing your garden	Path clearance, Bed preparation
July	Preparing your garden	Soil preparation, Digging , Weeding
August	Preparing your garden Beginners guide to sowing	Final site prep, Plant out strawberries
August	Sowing, Pest education	Sow spring onions, broad beans, cabbage
August	Sowing, Companion plants	Sow rocket, spinach, swede
August	Sowing, Potato varieties	Sow carrot, beetroot, and radish. Plant out potatoes (earlies)
September	Sowing, Herbs	Sow parsnip, peas, Develop herb patch
September	Sowing, Food Miles	Sow broccoli, courgette
September	Sowing, Harvesting, Seasonality	Harvest spring onions, Seasonality activity
September	Sowing, Harvesting, Mulching	Harvest rocket, Mulching activity
October	Sowing, Harvesting, Recipes	Harvest spinach, Recipe competition
October	Sowing, Harvesting, Supporting beans	Sow chives, coriander, Structures in place to support climbing beans
October	Sowing, Harvesting, Maintenance	Harvest strawberries, Weeding
October	Sowing, Harvesting, Baskets	Plant out pre-sown leeks, Create edible hanging baskets (tomatoes and herbs)
November	Sowing, Harvesting, Smoothie making	Harvest peas, How to make a smoothie with grown produce
November	Sowing, Harvesting, Wild food walk	Harvest first batch of potatoes, Finding the food on our doorstep
November	Harvesting	Cutback strawberry plants
November	Harvesting, Developing a rota	Harvest cabbage, weeding, maintenance
December	Harvesting	Harvest beetroot, and other produce that looks ready to come out of the ground.
December	Harvesting	Harvest later varieties
December	Harvesting, Developing recipes	Harvest broad beans, carrots
December	Harvesting, Soil investigation	Harvest broccoli, learning about the nutrients in our soil
January	Harvesting, Wild food walk	Harvest chives, coriander. Recipes using free food
January	Harvesting, Street Meal	Harvest courgettes, Meal to celebrate harvest using grown produce

5.12 Background Reading: Part IV

5.12.1 Theory of Action and Theory of Change

A Theory of Action is the delivery model for a Theory of Change. A Theory of Change describes the processes through which change comes about for individuals, groups or communities (e.g. the action is physical activity, the change is increased physical activity levels). Theories of change are the mechanisms within an intervention which lead to any intended outcomes (Pawson and Tilley, 1997). Figure 5.14 shows a revised version of a diagram presented by Coffee.com, depicting why '*a program theory simply does not exist without a Theory of Action articulating how the Theory of Change will be delivered'* (Coffey.com, 2019, page 1).

Figure 5.14 Adapted from a diagram in 'What is a Theory of Action?' Coffey.com



By identifying an interventions theories of change, further development of the programme theory can take place (Malden *et al.,* 2019). Developing a logic

model allows the depiction of how each mechanism is connected to and impacts upon an outcome. A logic model can tell the story of the community gardening programme. It shows the causal connection between the need that has been identified, what needs to be done and how it can make a difference for individuals and communities.

5.12.2 Developing a Logic Model

> *"A logic model is a graphic display or map of the relationship between a programme's resources, activities and intended results, which also identifies the programme's underlying theory and assumptions". (Kaplan and Garrett, 2005)*

Components can be set out in a consistent and comprehensive way, providing a framework to judge success against. As part of developing a logic model for '*Nourishing Neighbourhoods'*, four steps were taken:

1- Underlying issues were identified through existing literature and consultation from study one

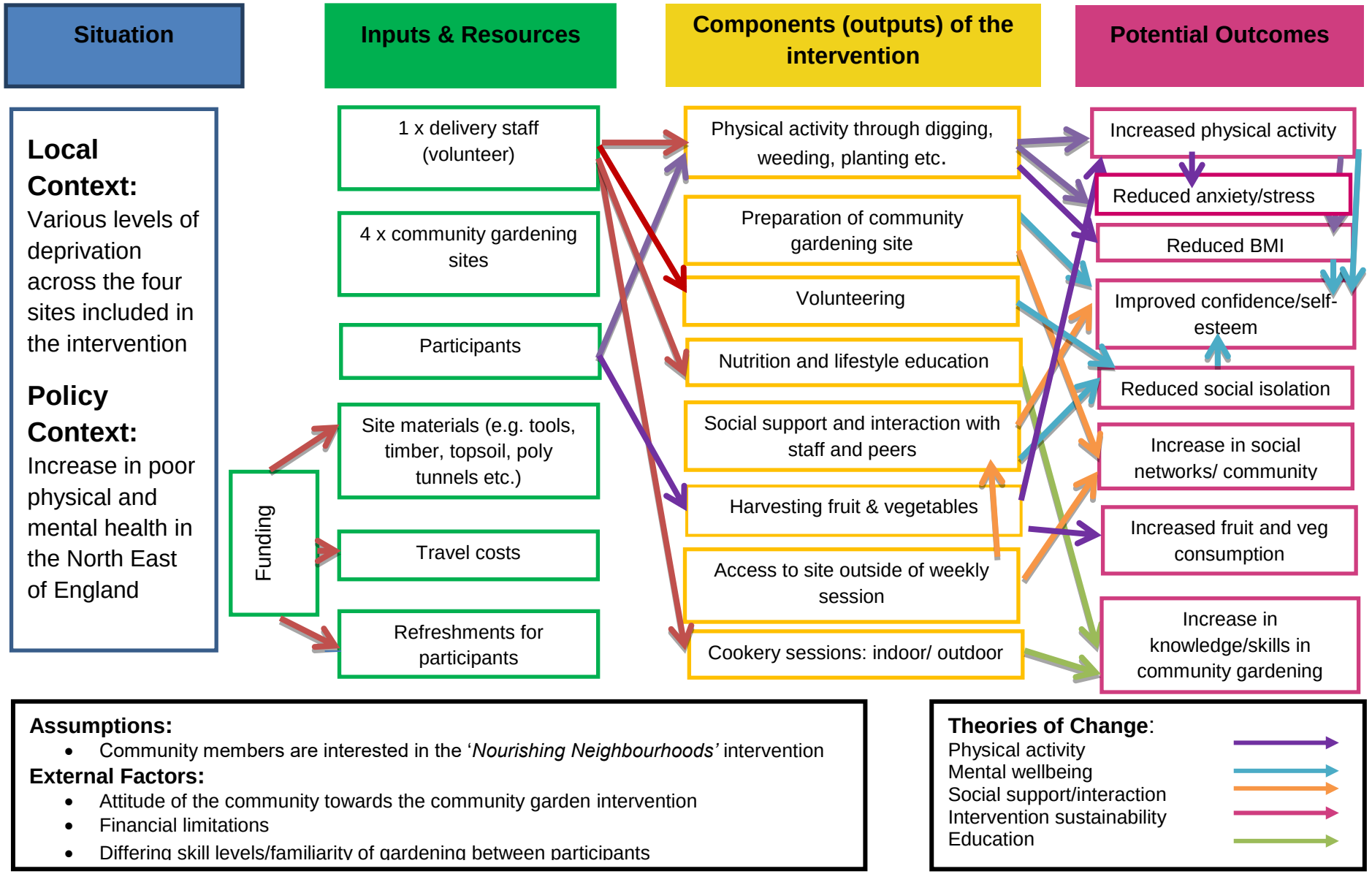
2- Planned inputs and desired purpose were determined

3- Intervention components were determined

4- Potential mechanisms of outcomes and impact were identified

Based on the Theory of Change, the Theory of Action, following guidelines for developing logic models, the assumptions presented by Lovell *et al.,* (2014), and the theories discussed in chapter one that potentially align with Lovell's model, Figure 5.15 shows the development of a pre-intervention logic model for '*Nourishing Neighbourhoods'.* The findings from Study One, previous experience and knowledge and finally drawing on the expertise within Groundwork North East have also helped to inform the development of the '*Nourishing Neighbourhoods'* logic model.

Figure 5.15: A potential logic model for 'Nourishing Neighbourhoods'



The logic model was then tested in Study Two and Three, and is discussed in chapter eight.

5.13 Intervention Delivery and Refinement

Once the logistic protocol of how each site would run sessions was in place, it was time to get outdoors and deliver. After utilising a variety of sources and resources to develop *'Nourishing Neighbourhoods*', the content was in place for a 24 week programme which could be flexible depending on the site participant needs. This flexibility allowed for continual refinement of the content throughout the intervention delivery period. Flexibility was essential as the sites were all in different build stages. For example, at the start of delivery, two sites had greenhouses, two didn't. This had an impact on what could be grown in the first few sessions of the programme. Another example of progamme flexibility being an essential component of '*Nourishing Neighbourhoods'* was the mix of participants between sites. One site had a higher number of families engaged in the intervention, therefore asked for sessions that could be adapted or had variations for young people to engage with also.

This chapter has described the development of the community gardening intervention, '*Nourishing Neighbourhoods'*, which ran for 24 weeks on four sites. The data that was collected as part of the intervention is reported in chapter six (Study Two: Examining the Statistics) and chapter seven (Study Three: Exploring the Narrative).

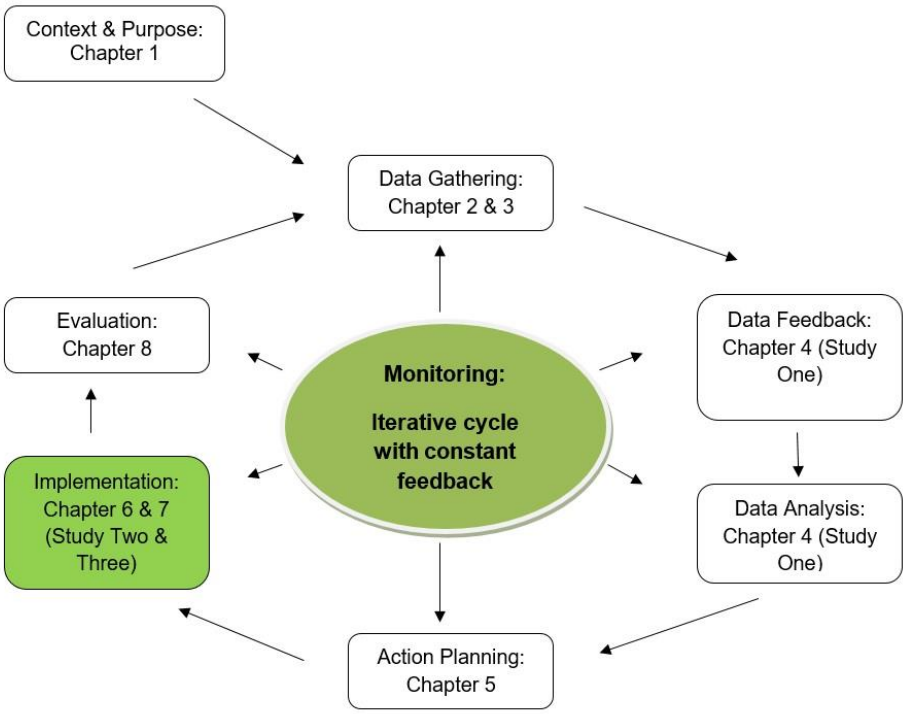
CHAPTER SIX: NOURISHING NEIGHBOURHOODS; EXAMINING THE STATISTICS

6.1 Introduction

The previous chapters in this thesis laid the groundwork for undertaking an exploratory piece of research to evaluate the feasibility of delivering a complex health intervention in the form of a community gardening project in County Durham. Problems associated with health were presented in chapter two. The views of local residents in County Durham in relation to community gardens were explored in chapter four. Chapter five described the systematic development of a complex health intervention called '*Nourishing Neighbourhoods'.* Based on the findings of chapters four and five, a community gardening programme was developed, which was rolled out as a six-month health intervention across four sites in County Durham. This chapter presents the findings from *Study Two; Nourishing Neighbourhoods: Examining the Statistics*, which forms an integral part of this mixed methods study. I then establish links between the results within the scope of existing literature discussed in chapters one through to five, with findings organised as they relate to the thesis aims and objectives.

As outlined in previous chapters, the action research cycle in Figure 6.1 demonstrates where this chapter (Study Two) and chapter seven (Study Three) fit within the iterative research process.

Figure 6.1: The Action Research Cycle; Study Two and Three



6.2 Rationale

Participants were assessed at baseline, eight, 16 and 24 weeks of the 'intervention' period. The primary analysis of the feasibility and acceptability of the community gardening intervention aimed to compare recruitment rates with retention rates after a six-month project, as well as evaluating adherence to the intervention. Analysis of secondary outcomes is based on the difference between baseline and end line (six months) of the intervention period.

6.3 Aims and Objectives

6.3.1 Aims

This study aimed to evaluate the acceptability and feasibility of this intervention in County Durham and obtain data to inform the sample size

calculation for a definitive trial; and to add to the knowledge base by identifying the key components of successful community based interventions. The intervention was a community garden project called '*Nourishing Neighbourhoods'*, which was designed to encourage individuals and groups to partake in growing fruit and vegetables, adopt healthy eating practices, and take part in regular physical activity. Changes in measurements of physical activity levels, fruit and vegetable intake, BMI and measures of self-reported health and quality of life were examined.

6.3.2 Objectives

The two primary objectives were:

- Evaluate the recruitment and retention rates of participants enrolled and engaged in the community gardening intervention.
- Evaluate adherence to the community gardening intervention.

Secondary outcomes:

- To assess whether it was feasible to assess and measure changes in fruit and vegetable intake.
- To examine whether it was feasible to assess and measure any changes in BMI.
- To examine whether it was feasible to assess and measure any changes in physical activity levels.
- To assess whether it was feasible to measure any changes in self-reported health and quality of life.

- Exploration of the financial costs required to deliver an intervention such as '*Nourishing Neighbourhoods'*

6.4 Methods

6.4.1 Study Setting

Four sites were chosen as the settings for this intervention: Barnard Castle; Horden: Leeholme; and Ferryhill. The geographical location of these sites can be seen in Figure 6.2. The sites were chosen because they were local to the researcher, allowed the researcher to cater for the financial implications associated with the thesis, and were readily accessible. Furthermore, they were located in socio-economically disadvantaged areas in County Durham; providing a setting in which to explore the potential impacts on disadvantaged communities and health inequalities.

Figure 6.2: Locations of four community garden sites in County Durham

There are 14 Area Action Partnerships (AAPs) within the County Durham boundary, which cover all areas of the county and are intended to be a way of engaging with both local people and other organisations and partnerships that operate within the area. According to the Durham County Council website, the AAPs *'allow people to have a say on services, and give organisations the chance to speak directly with local communities'* (About Area Action Partnerships, n.d). The AAPs are diverse in terms of both geography and demography. Easington AAP is the most highly populated with a total of over 92,000 residents, whilst Weardale has just over 8,000 residents.

The four sites used in the intervention were located in four different AAP areas: Ferryhill (4 Together Partnership AAP); Barnard Castle (Teesdale AAP); Horden (East Durham AAP); and Leeholme (Bishop Auckland and Shildon AAP). The four sites (as seen in Table 6.1 below) were broadly similar in terms of population size and gender balance. However, the levels of deprivation varied.

Table 6.1: Population data for the four community gardening sites used in the intervention

Site	Population[1]	Male %	Female %	Proportion living in the 30 % most deprived areas nationally[2]	Proportion living in the 10 % most deprived areas nationally[2]
Barnard Castle	8284	52 %	48 %	10.4 %	0 %
Ferryhill	8942	49 %	51 %	62.4 %	7.3 %
Horden	8087	49 %	51 %	73.7 %	23.9 %
Leeholme	7139	49 %	51 %	69.8 %	25.3 %

[1] 2011 Census figures (ONS, 2011)

[2] Proportion of the population living in the top 30 % and top 10 % most deprived areas using the index of multiple deprivation [IMD](Durham County Council, 2015).

6.4.2 Study Design

This study utilised a non-experimental pre-test/post-test design. The non-experimental design involves an intervention group only, rather than intervention and control groups, and although is often classified as lower on the "hierarchy of evidence" (Ogilvie, Egan, Hamilton *et al.,* 2005), there is a growing support for research that combines such designs with observational data collection (Evans *et al.,* 2003). Non-experimental designs are used when there are resource constraints, and when an appropriate comparison group is unable to be formed, which was the case with this study. Deliberation over potential control groups was given, such as a waiting list cohort, with '*Nourishing Neighbourhoods'* repeated with another four sites. However, there was not enough time to organise this, and there were financial constraints which meant this would be difficult to achieve. It is essential in non-experimental study designs to have a clear conceptual understanding of how the intervention is intended to influence the health outcomes of interest. As part of this process and during the development of the intervention, a logic model was created. This was presented and discussed earlier in the thesis, in chapter five. The development of a robust framework during the intervention planning stage was essential. Given the study context and the resources that were available, the most appropriate design was chosen.

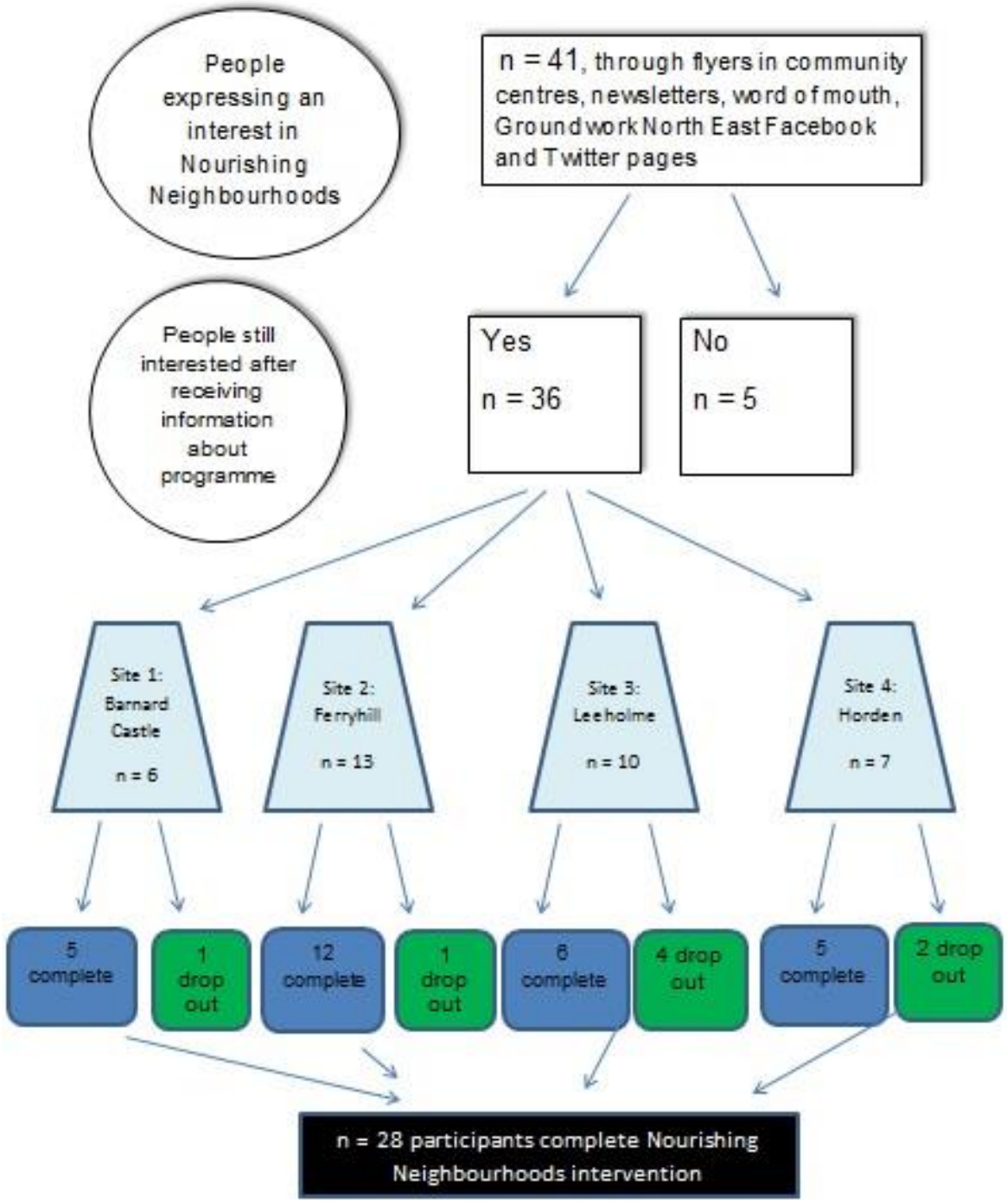
6.4.3 Sampling and Recruitment

This study used convenience sampling, which can be defined as a process in which research participants are selected based on their ease of availability. Essentially, individuals who are the most ready, willing, and able to

participate in the study are the ones who are selected to participate (Saumure and Given, 2008). Convenience sampling does have a number of limitations in that there could be bias with the participants who sign up to take part in the intervention. Furthermore, it is not possible to make generalisations about any findings as the sample may not be representative of the population studied (Sedgwick, 2013). This approach was chosen for Study Two (and also for Study Three, as described in chapter seven) as it is a relatively low cost method and helps to facilitate data collection in a short period of time. It is commonly used in pilot studies and service development research (Robson, 2016).

Potential participants from four communities within County Durham were invited to participate in the *'Nourishing Neighbourhoods'* project through local community networks. Groundwork North East publicised the community gardening project using its extensive community networks. Recruitment took place via publicity in community groups, schools, town and parish councils, local partnerships, local newspapers and social media such as the Groundwork North East Twitter feed and Facebook pages. Figure 6.3 is a flowchart which shows how the process filtered through to participant numbers.

Figure 6.3: A flowchart to explain the path of participants from initial recruitment to completion of Nourishing Neighbourhoods



Posters and flyers were utilised to help promote the project (Appendix N); these were displayed in community centres located within one mile of each site. Community members were able to express their interest to be involved

by getting in touch with a local key contact or myself by telephone, email or in person. For each site, a local key contact was identified to also have their names on any promotional material. This was so that potential participants felt comfortable when approaching the key contact to ask about the intervention. The key contacts included community centre managers and link workers within charity organisations. One of the sites had a direct link with a mental health organisation as the key contact for this site worked as one of their community link workers.

I arranged to meet with interested individuals via the key contacts at local community groups. The intervention was explained to these individuals and information sheets (Appendix O) with Groundwork North East consent forms (Appendix P) were distributed. They had seven days to consider whether they wanted to participate in the project and return their completed consent form and personal details form (Appendix Q) to a key contact identified within the community group, who then forwarded them to me. Participants were reassured that if they wanted to take part in the intervention, but not the evaluation, that was perfectly acceptable. Five participants showed an initial interest in the project but decided not to take part because of work commitments (n = 3); because it wasn't the kind of project they thought it would be (n = 1); and because of a health issue preventing involvement (n = 1).

Once signed up to the community gardening project, potential participants were invited to take part in the evaluation of the intervention. They were provided with verbal information about the study prior to distributing additional evaluation information sheets and consent forms. Data were only

collected from those who agreed to take part in the evaluation and met the following inclusion criteria:

Inclusion criteria

1. Aged 18 years or above
2. Ability to give informed consent
3. Living within County Durham and within one mile of a '*Nourishing Neighbourhoods'* community garden site.

Exclusion criteria

1. Under 18 years old
2. Unable and/or unwilling to give informed consent
3. Living more than one mile away from a '*Nourishing Neighbourhoods'* community garden site.

The intervention was open to people of all ages, as well as those who did not wish to engage with the evaluation. Individuals had seven days to consider whether they wanted to take part in the evaluation, and if they did, they were asked to return their completed consent form to the researcher via a key contact at each community setting.

Arrangements for the commencement of the intervention were made with the key contact at each community group. Before the intervention commenced, I reiterated what was involved, and asked for participants to confirm that they were willing to take part. They were also informed that they were free to withdraw from the study at any time up until the end of the intervention period.

The evaluation was targeted at adults, but the intervention itself was open to people of all ages, so that communities and families did not feel excluded from the intervention. In total there were 42 intervention beneficiaries and 36

study participants. The difference of six is attributed to young people under the age of 18 who were not eligible to take part in the study, but who chose to be involved in the *'Nourishing Neighbourhoods'* programme. The young people would attend sessions during school holidays and would accompany their parents and/or grandparents.

6.4.4 Measures

The measurement tools selected for Study Two include:

- FACET: A tool which measures fruit and vegetable intake over the past 24 hours.

- SF-8: A tool which measures health related quality of life over the past four weeks, looking at both physical and mental outcomes.

- IPAQ: The IPAQ is a tool which measures levels of physical activity over the past seven days.

- BMI: The collection of height and weight to measure an individual's Body Mass Index (BMI).

The justification for the selection of these quantitative measurement tools was outlined in the methodology chapter (chapter three). All tools were self-report surveys, apart from the BMI data, which I collected from participants and recorded.

6.4.5 Data Collection

At baseline, eight, 16 and 24 weeks, participants had their BMI measurements taken, and were asked to complete the FACET, SF-8 and IPAQ questionnaires. At each time point, participants were asked to

complete another consent form (Appendix R, S and T) before these data were collected. This was to ensure that consent to take part in the study was constantly being re-negotiated and so that participants did not feel pressured or coerced into continuing with the study if they did not want to.

A decision was made to collect data at two-monthly intervals due to the rolling nature of the project, and because it was possible to collect significantly more data than might usually be collected with only a minimal requirement for additional researcher effort. At the beginning of each session, I would take a register and would complete a risk assessment. As part of the risk assessment, I would record weather details (temperature and description) in a log book (Appendix U). The extra data allowed analyses to be carried out to examine the effects of seasonality on participation, quarterly changes in anthropometrics, dietary intake, physical activity levels and quality of life measures, which could be potentially useful in guiding optimal start date(s) for community gardening programmes as well as optimal length of such programmes.

6.4.6 Data Storage and Analysis

Hard- copy questionnaire data were inputted into an electronic database on Microsoft Excel for storage after completion at baseline, eight weeks, 16 weeks and 24 weeks. Participants' personal details were stored in a separate database and each participant was provided with a unique ID code linked to all responses on the questionnaires.

Quantitative data relating to the primary outcome measures were imported and analysed using Microsoft Excel. Trends and descriptive statistics were

used to analyse any changes in outcomes. As this study was primarily concerned with evaluating the feasibility and acceptability of the intervention, no tests of significance were applied, as the results would more than likely be underpowered, and therefore significance would be unreliable.

6.4.7 Ethical Considerations

There were a number of key ethical considerations in relation to Study Two. There was a risk that some individuals encountered within the research process could be considered vulnerable adults, in terms of being in receipt or in need of community care services due to physical disability, mental ill health, age or illness (Department of Health, 2011b). The ethical implications arising from working with such vulnerable adults required consideration before the intervention started and throughout the delivery period. Some participants displayed various levels of mental ill-health, learning difficulties and/or illness. During the intervention, I came into contact with vulnerable adults and children (attending the intervention with parents or other family members). It was vital to ensure that the evaluation and data collection process did not have a negative impact on any of the participants.

To ensure that these ethical considerations were reflected in the research design, an application for ethical approval was made to the research ethics sub-committee of the School of Medicine, Pharmacy and Health, Durham University. This process was a complex and difficult one due to the nature and scope of the intervention and my dual role of deliverer and evaluator. As part of the reflective process, it was important to view this process as not just a hurdle to overcome, but as a crucial part of the learning process and development of becoming a researcher. The ethics process granted the

opportunity to think carefully about the process of developing, delivering and evaluating an intervention. Although I have only touched on them here, ethical issues are discussed in much greater detail in the discussion (chapter eight).

Ethical approval was received for Study Two (and Study Three) from the School of Medicine, Pharmacy and Health Research Ethics Sub-Committee at Durham University on 20th July 2015 (reference ESC2/2015/01) (Appendix V).

6.5 Results

6.5.1 Demographics

Thirty-six participants were recruited into the evaluation. Table 6.2 provides a breakdown of gender by site and highlights that the overall programme had a slight bias towards male recruitment at baseline, with men making up 58 % of the sample. This was not replicated across all four sites however, with Barnard Castle and Horden having more of a female presence.

Table 6.2: Breakdown of gender across sites

Site	No. of women	No. of men	Total no. of participants
Leeholme	1	9	10
Barnard Castle	4	2	6
Horden	5	2	7
Ferryhill	5	8	13
Totals	15	21	36

The mean age of participants recruited across all four sites was 47 years (SD = 11.13, range 28-68). The mean age of female participants was 50.5 years

(SD = 12.88, range 28-68), while the mean age of male participants was 44.5 years (SD = 9.21, range 29-61).

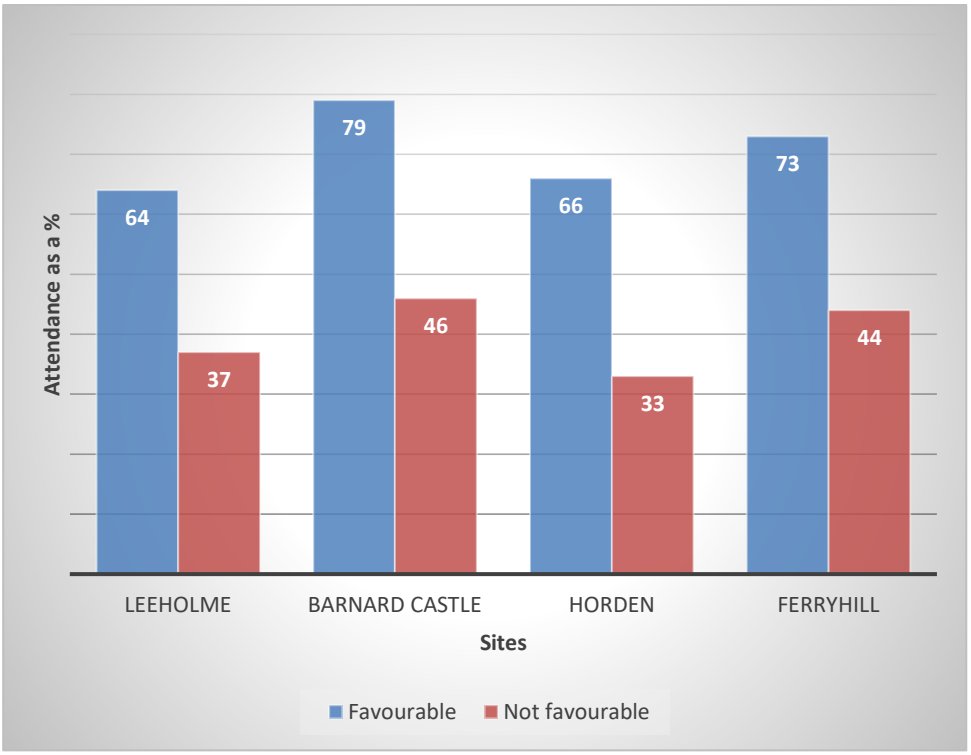
There was a difference in mean age between the four sites at baseline. The site with the youngest group was Ferryhill (M = 42.2), with Horden hosting the oldest group of participants (M = 55.3). Leeholme and Barnard Castle had older males in comparison to females, while Horden and Ferryhill had older females engaged in the programme in comparison to males. It must be noted that the figures for Leeholme are slightly skewed as out of 10 participants, only one was female.

No data were recorded on the ethnicity of participants, their socio-economic status or whether they were classed as having a disability, although in hindsight, this would have been useful data to collect.

6.5.2 Attendance and Retention

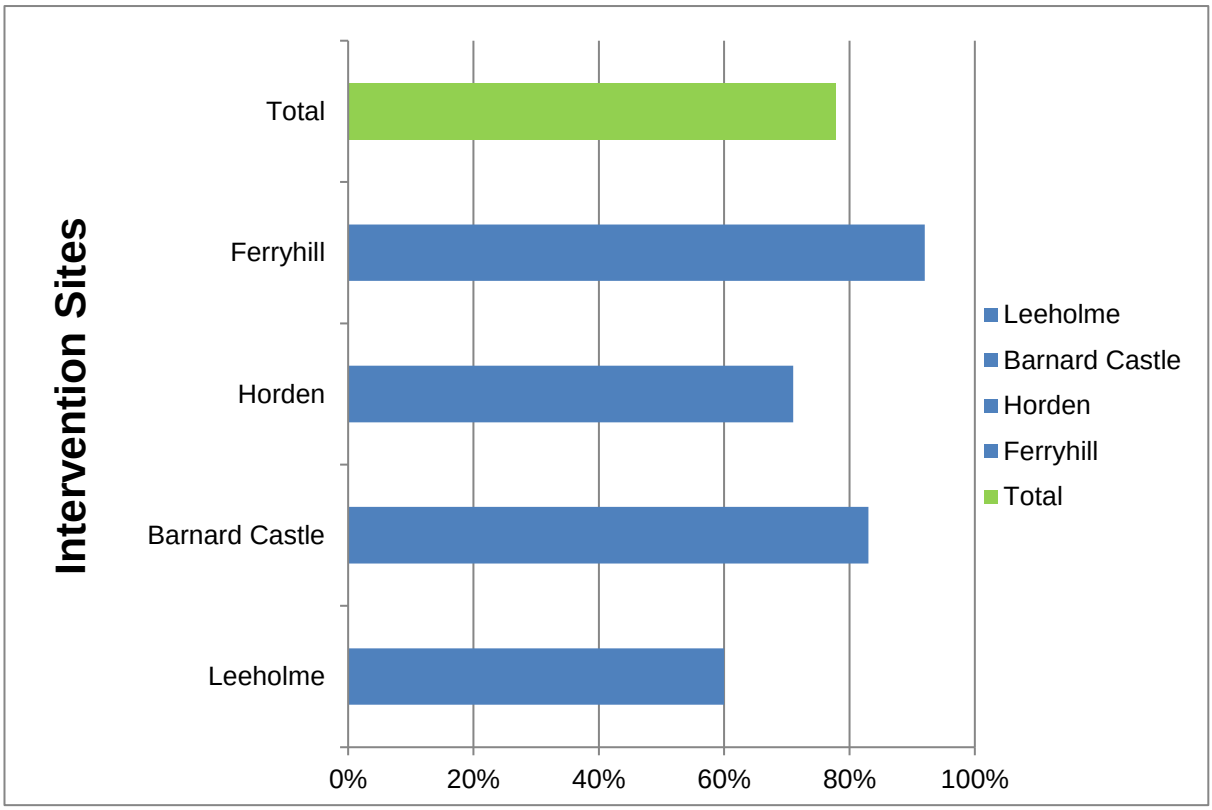
Figure 6.4 compares the percentage of participants in attendance across all sites with whether the weather was favourable or not. Attendance being defined as the proportion of participants at a session as a % of the baseline number for each site. Temperature and conditions were noted at the start of each session, and based on these, a session was noted as ‘not favourable’ if it was windy, raining, cold, or a combination of the three. It is clear to see that there is a trend showing that when the weather was ‘not favourable’, the percentage of participants attending a session decreased dramatically.

Figure 6.4: Attendance rates as a percentage across all four sites when weather was classed as 'favourable' or 'not favourable



Retention of participants in this study is defined as participants who remained engaged with the programme, attending the first and last session and attending at least 50 % of the sessions. Of the 36 participants who signed up to '*Nourishing Neighbourhoods'*, 28 (78 %) remained engaged for the duration of the six-month intervention. This can be further broken down into 15 men (71 % of the 21 who commenced the intervention) and 13 women (87 % of the 15 who commenced the intervention). Figure 6.5 below shows the retention percentage for each site.

Figure 6.5: Retention of participants on each site across the intervention



What was interesting to note was that those participants who dropped out of the programme did so before week eight. After this date, retention was 100 % for the participants still engaged with '*Nourishing Neighbourhoods'*.

The average age of the participants who dropped out of the intervention was lower than those who continued to attend for the full six-month duration across all sites, with the exception of Leeholme. Those who dropped out of the programme had a mean age of 47 (Leeholme), 34 (Barnard Castle), 40 (Horden) and 38 years (Ferryhill). The mean age of participants who maintained attendance for six months were 46 (Leeholme), 41 (Barnard Castle), 58 (Horden) and 43 years (Ferryhill). This split can be seen more clearly in Table 6.3.

Table 6.3 Average age of drop outs in comparison to average age of participants who adhered to the intervention

Site	Mean age of participants who adhered to the intervention for six months	Mean age of participants who dropped out of the intervention
Leeholme	46 (n = 6)	47 (n = 4)
Barnard Castle	41 (n = 5)	34 (n = 1)
Horden	58 (n = 5)	40 (n = 2)
Ferryhill	43 (n = 12)	38 (n = 1)

Between genders, 87 % of females completed the programme compared to 67 % of males. Table 6.4 highlights that this higher completion rate for females was the same across all sites except for Barnard Castle, where males had a higher programme completion rate of 100 % compared to females at 75 %.

Table 6.4: Participants who completed the project, split by gender and site

Site	Recruited	Completed programme	Male completion	Female completion
Leeholme	10 (9 male, 1 female)	60 % (6/10)	55 % (5/9)	100 % (1/1)
Barnard Castle	6 (2 male, 4 female)	83 % (5/6)	100 % (2/2)	75 % (3/4)
Horden	7 (2 male, 5 female)	71 % (5/7)	50 % (1/2)	80 % (4/5)
Ferryhill	13 (8 male, 5 female)	92 % (12/13)	88 % (7/8)	100 % (5/5)

In terms of socioeconomic status, a lower completion rate correlates with the sites with higher levels of deprivation, with three of the four sites following a clear gradient. However, Ferryhill goes against this trend, having the highest level of completion at 92 %, yet sitting behind Barnard Castle as the second least deprived site in this study.

Out of 96 sessions across the sites (24 on each of the four sites), five were cancelled due to severe weather conditions, when it was deemed unsafe to run a session. Out of the 91 sessions that went ahead, all had one or more attendees.

6.5.3. Financial Analysis of the Intervention Cost

Health promotion interventions compete with the treatment of disease for scarce health resources. To assist with the allocation of resources, economic evaluation should be considered alongside outcome evaluation in the evaluation of health promotion interventions (Stevens 2004). Economic evaluation is defined as *'the comparative analysis of alternative courses of action in terms of both their costs and consequences'* (Drummond *et al.,* 2015).

I did not set out with an objective to carry out a cost benefit analysis of the '*Nourishing Neighbourhood'* intervention. Similarly, I did not have two alternative interventions to use as comparators. However, I did collect data on what the expenditure was throughout the programme, as I wanted to monitor what the costs were throughout. In hindsight, I now feel that this data could be quite useful for commissioning bodies, to be able to get an idea of the practical costs of running such a programme. To the best of my knowledge, there is no set method for assessing the cost-effectiveness of community gardening schemes. This is potentially something that could be developed within the realms of further research.

This section contains information on capital expenditure, revenue expenditure, and in-kind spending. Costs were covered by me as part of the self-funded thesis. The resources assessed for the delivery of the intervention include only those resources that would be needed if the intervention were to be provided in practice in the future (McAuley *et al.,* 2010). I costed the resources involved with '*Nourishing Neighbourhoods'* which included:

- Staff time preparing sessions, travelling to sessions and delivering the session. Although I delivered the intervention as a volunteer for Groundwork North East so there was no financial outlay, this has been costed using the charge out rate of £18 per hour which has been taken from the 2015-16 pay scale for a project officer salary at GNE.
- Expenses incurred from travelling to sessions, which have been costed at 40p per mile as per Groundwork North East costs.
- Costs of all materials used across the four sites.
- Costs for printing of flyers, information sheets, consent forms and surveys.

The tables below (Table 6.5, 6.6 and 6.7) provide a breakdown of the three biggest costs associated with '*Nourishing Neighbourhoods'*; staff time, travel costs and resources for delivery of the programme. Resources included timber, topsoil, seeds, tools, poly tunnels, PPE and refreshments.

Table 6.5: Time spent on the 'Nourishing Neighbourhoods' programme (Planning, Delivery and Travel)

Site	Session Time (Hours)	Prep Time (Hours)	Travel (Hours)	Total Time	Hourly rate	Cost per session	24 sessions
Leeholme	2	1	1 hour 20 minutes	4 hours 20 minutes	£18	£78	£1872
Horden	2	1	30 minutes	3 hours 30 minutes	£18	£63	£1512
Barnard Castle	2	1	2 hours	5 hours	£18	£90	£2160
Ferryhill	2	1	1 hour 20 minutes	4 hours 20 minutes	£18	£78	£1872
						TOTAL COST	£7416

Table 6.6: Mileage costs associated with delivering Nourishing neighbourhoods

Site	Round trip to site (miles)	Cost (@40p per mile)	Sessions	Total cost
Leeholme	40	£16.00	24	£384
Horden	20	£8.00	24	£192
Barnard Castle	72	£28.80	24	£691.2
Ferryhill	36	£14.40	24	£345.6
			TOTAL COST	£1612.8

Table 6.7: Cost of resources to deliver the Nourishing Neighbourhood programme across four sites

Week	Leeholme (£)	Ferryhill (£)	Horden (£)	Barnard Castle (£)	Refreshments (£)	TOTAL COST
1	90			46	10	
2	20	46		20	10	
3	46	20	20	90	10	
4			46		10	
5		90			10	
6					10	
7			20		10	
8				40	10	
9	30				10	
10			33		10	
11				120	10	
12			90		10	
13					10	
14					10	
15	32				10	
16					10	
17					10	
18		16			10	
19	90				10	
20					10	
21					10	
22					10	
23					10	
24					10	
TOTAL	308	172	209	316	240	£1245

The total calculation came in at £10, 323.80, which can be seen in Table 6.8. That covered a member of staff delivering a weekly community gardening programme in four local communities in County Durham for six months. A very crude calculation works out that at baseline with numbers recruited, the

programme worked out at £286.77 per head. However, following on from participant drop out from 36 to 28, that figure rose to £368.70.

Table 6.8: An approximate cost for the delivery of 'Nourishing Neighbourhoods'

Staff time	£7416.00
Mileage costs	£1612.80
Resources for delivery	£1245
Printing costs	£50
TOTAL COST	£10,323.80

Taking the information from the table above (excluding the printing costs) and splitting it between sites, the total spend at Leeholme was £2624; Horden was £1936; Barnard Castle was £3120.20; and Ferryhill was £2930.60. With regard to the cost per session for each site, the average cost was £107.27. Barnard Castle had the highest cost for a single session, costing £130.00. Leeholme and Ferryhill cost £109.33 and £108.07 respectively. One session carried out at Horden was the cheapest, costing £81.67 on average.

Breaking the financial information down further, it can be seen the cost per individual for one session ranged from £8.31 (Ferryhill) to £21.67 (Barnard Castle). The cost to attend a programme per individual ranged from £225.43 (Ferryhill) to £520.00 (Barnard Castle). The breakdown is shown in Table 6.9.

Table 6.9 Costs to attend a Nourishing Neighbourhoods session and programme per individual

Site	Number of participants	Cost of one session for whole group	Cost per session for an individual	Cost to attend the full *'Nourishing Neighbourhoods'* programme per individual
Leeholme	10	£109.33	£10.93	£262.40
Horden	7	£81.67	£11.67	£276.57
Barnard Castle	6	£130.00	£21.67	£520.00
Ferryhill	13	£108.07	£8.31	£225.43

The basic economic analysis of the intervention suggests that the scheme is relatively inexpensive. What was not examined in this thesis was the direct cost for participants to attend the *'Nourishing Neighbourhoods'* programme. This could have included travel costs, clothing and footwear, etc. Some participants actually brought resources to the site out of their own pocket. I also was not able to calculate any savings participants made. For example, there could have been savings from produce harvested which may have reduced food bills.

A possible development for future research would be to carry out an actual cost benefit analysis of an intervention such as '*Nourishing Neighbourhoods'*- with a comparison of costs running it as volunteers; a local authority; and a private company, to see the variation in cost.

6.5.4 Body Mass Index

Table 6.10 provides descriptive statistics of the calculated BMI for participants at baseline and weeks eight, 16 and 24 of the intervention '*Nourishing Neighbourhoods'*. Mean BMI across all sites and participants stayed the same at 27, which is in the overweight category. However there were some changes between the time periods in the data gathered for male and females. It also was important to look at the mean BMI of those who completed the intervention and those who dropped out.

Table 6.10: BMI calculations for gender and all participants across four time points

BMI (kg/m^2)	Baseline (July/Aug 2015)	8 weeks (Sept 2015)	16 weeks (Nov 2015)	24 weeks (Dec/ Jan 2016)
Male	27.90 (n = 21)	27.73 (n = 16)[2]	27.45 (n = 15)[4]	28.08 (n = 15)
Female	25.49 (n = 12)[1]	25.26 (n = 11)[3]	24.69 (n = 11)[5]	25.49 (n = 11)[5]
All participants	27.05 (n = 33)	26.73 (n = 27)	26.28 (n = 26)	26.98 (n = 26)

[1] 3 female participants did not want to provide BMI data.
[2] 5 male drop outs before week 8 data collection point.
[3] 3 female drop outs before 8 week data collection point and 2 other female participants did not want to provide BMI data.
[4] 1 male dropped out before week 16 data collection point.
[5] 2 female participants did not want to provide BMI data

Table 6.11 shows that the mean BMI of those who dropped out of the intervention was slightly higher (28) than those who completed the programme (27). There was no difference in BMI between males who dropped out (28). However, there was a difference in this small sample between women who completed the intervention (25) and those who dropped out (27).

Table 6.11 Mean BMI of intervention drop outs compared to intervention completers at baseline

	Mean BMI of participants who completed the intervention	**Mean BMI of participants who dropped out of the intervention**
BMI score for all participants	26.88 (n = 27) [1]	27.70 (n = 7) [2]
BMI Score: Male	27.97 (n = 15)	27.90 (n = 6)
BMI Score: Female	25.40 (n = 11)	26.50 (n = 1)[3]

[1] 28 participants completed the intervention, but one did not want to be weighed at baseline.
[2] 8 participants dropped out, but one did not want to be weighed at baseline.
[3] This is not a mean, as it only represents one participant

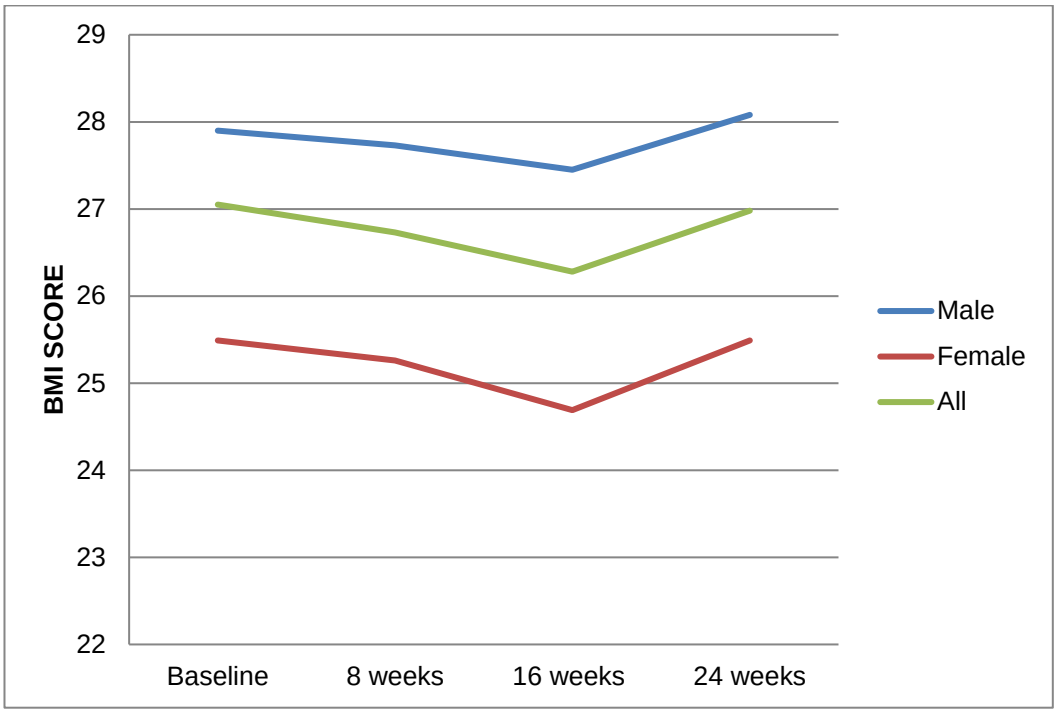
Table 6.12: Mean BMI across all time points, and divided by site

Site	Baseline (July/Aug 2015)	8 weeks (Sept 2015)	16 weeks (Nov 2015)	24 weeks (Dec/ Jan 2016)
Leeholme	27.04 (n = 10)	25.50 (n = 6)	25.05 (n = 6)	26.05 (n = 6)
Barnard Castle	24.84 (n = 5)	24.33 (n = 4)	24.08 (n = 4)	24.90 (n = 4)
Ferryhill	28.08 (n = 13)	28.28 (n = 12)	27.81 (n = 12)	28.31 (n = 12)
Horden	26.62 (n = 6)	26.40 (n = 5)	25.78 (n = 4)	26.50 (n = 4)

Table 6.12 looks at BMI changes across all four sites across all time points. Ferryhill had the participants with the highest mean BMI score at baseline (28), whilst Barnard Castle had the lowest at 25. By week 24, Ferryhill still had the highest average BMI score, whilst Barnard Castle still had the lowest average BMI. It is not surprising that Barnard Castle had the lowest BMI average, with it being the least deprived (Durham County Council IMD, 2015) out of the four sites. What is surprising is that Ferryhill was the second least deprived site, yet had the highest BMI average. However, it must be acknowledged that the sample size was very small.

Figure 6.6 highlights the decrease in BMI for both males and females at eight and 16 weeks, but a slight increase at week 24.

Figure 6.6 BMI scores for male, female and all participants, showing change across all four time points from baseline to 24 weeks



6.5.5 Fruit and Vegetable Intake

Participants were requested to indicate on a 5-point scale (0 to 4 portions) how often they consumed certain foods at various meal times during the previous day. Nine of the 14 questions are relevant to the assessment of fruit and vegetable intakes. Questions 2, 4, 5, 6 and 14 refer to fruit intake, while questions 8, 9, 11 and 13 refer to vegetables.

As revealed by table 6.13, the average number of fruit and vegetables consumed increased slightly by week 16, but returned to the baseline level at 24 weeks.

Table 6.13: Total fruit and vegetable portion intake during a 24 hour period at baseline, week 8, 16 and 24

Data collection point	Mean number of fruit and vegetable portions eaten per day	Standard Deviation
Baseline (n = 36)	5.00	4.01
8 weeks (n = 28)	4.75	3.78
16 weeks (n = 28)	5.57	4.92
24 weeks (n = 28)	5	5.32

Figure 6.7 shows the responses to the question, 'How many vegetables do you think a health expert would recommend eating every day?' At baseline, two-thirds of the participants believed that five portions of fruit and vegetables was the recommended amount. A quarter believed it was 7+, and 8 % believed that two portions a day was the advice given by health professionals. Zero participants responded with 'don't know'. After 24 weeks it was still approximately two-thirds of the participants (61%) that believed five portions of fruit and vegetables was the recommended amount to consume per day. The figures stayed the same for answering 7+, with 3% believing that three portions a day was the recommended advice. Surprisingly, 11% of participants said that they did not know.

Figure 6.7 Participants knowledge of fruit and vegetable daily consumption recommendations at baseline and 24 weeks

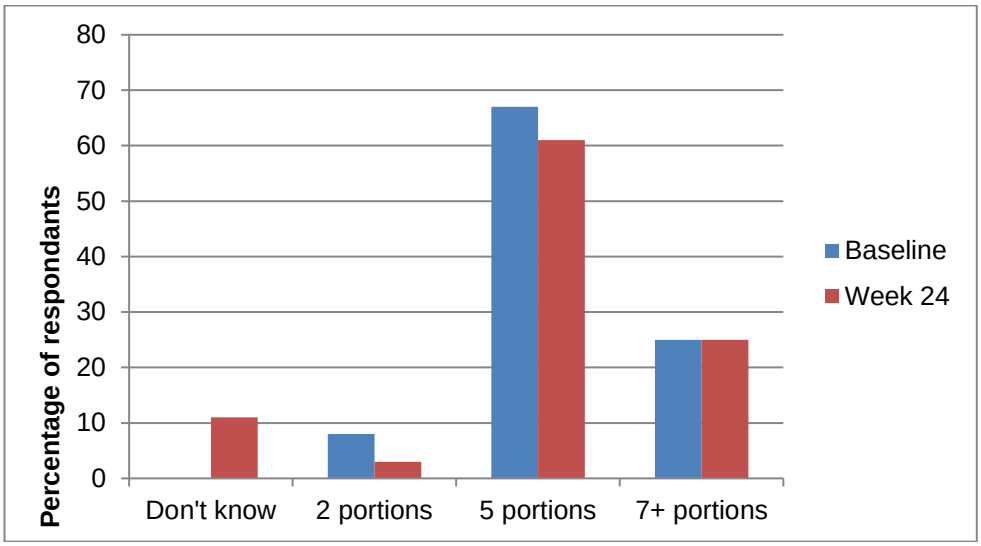
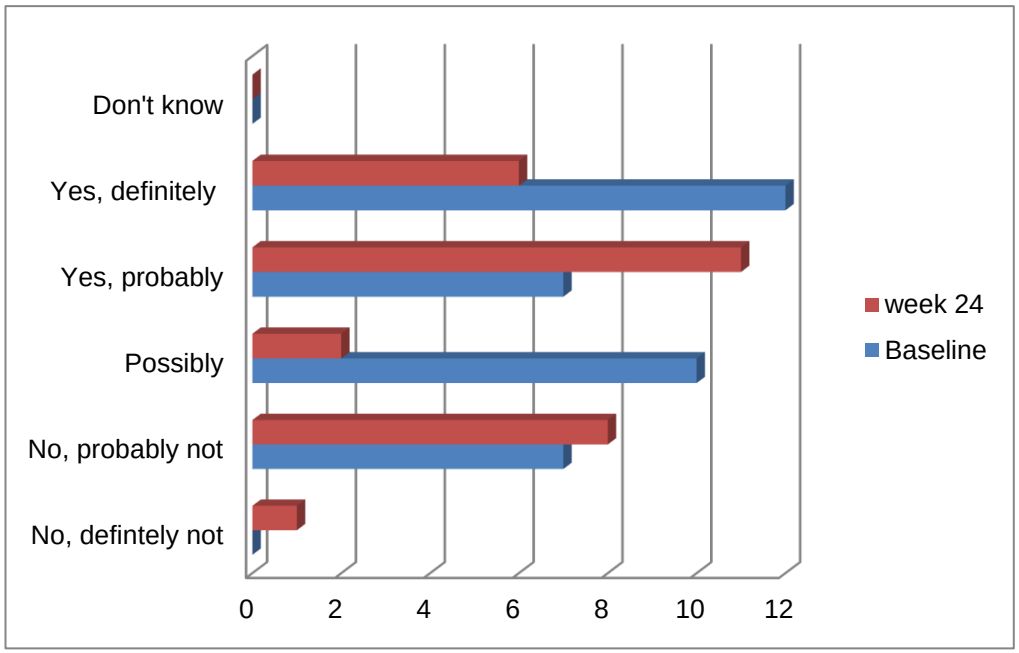


Figure 6.8 highlights the change in participant's beliefs in future fruit and vegetable consumption, after being asked *'Do you think you will increase the amount of fruit and vegetables that you eat in the next year?'* Although there was an increase in participants stating they would 'probably' increase their intake, there was a decrease in participants stating they would 'definitely' increase consumption, and surprisingly, an increase in the 'no, probably not' category. Additionally, there were no gaps or anomalies in the FACET data.

Figure 6.8: Participant beliefs on their future fruit and vegetable consumption



6.5.6 Physical Activity Levels

Table 6.14 shows the mean values for participants across the four time points for how many days a week and minutes per day were spent carrying out vigorous and moderate activity. There was a slight increase in the number of days spent per week on vigorous activity (2 to 2.6), and the time spent on vigorous activity increased from 39 minutes at baseline to 78 minutes at week 24. In terms of moderate physical activity, there was a reduction in days spent engaged (from 2.9 to 2.6) days per week. There was also a reduction in minutes spent on moderate physical activity, from 77.6 to 71.4 minutes. This could potentially have been a trade-off for participants increasing physical activity levels in the vigorous category.

Table 6.14 Number of days and amount of time spent on moderate and vigorous physical activity

Question	Vigorous days per week				Vigorous time in minutes				Moderate days per week				Moderate time in minutes			
Week	B*	8	16	24	B	8	16	24	B	8	16	24	B	8	16	24
Number (N)	36	28	28	28	36	28	28	28	36	28	28	28	36	28	28	28
Mean	**2.00**	**2.29**	**2.46**	**2.64**	**38.61**	**56.79**	**76.43**	**78.21**	**2.92**	**3.61**	**2.21**	**2.57**	**77.64**	**95.18**	**57.14**	**71.43**
Standard deviation	2.44	2.30	2.27	2.23	47.94	62.65	77.18	69.39	2.84	2.63	2.64	2.63	88.85	80.36	62.94	72.61

*B denotes baseline

Table 6.15 highlights that there was a slight reduction in number of days spent walking per week, from 5.9 at baseline, to 5.4 at week 24. The amount of time spent walking also reduced across the six-month programme, from 98 minutes (baseline) to 92 minutes (week 24). There was a reduction of 13 minutes per day spent sitting down; 224 minutes at baseline, reduced to 211 minutes by week 24. Three responses were missing for the sitting down question. This was the only missing data from the IPAQ questionnaire.

Table 6.15 Number of days walking for at least 10 minutes and average time per week spent walking and sitting from baseline to 24 weeks

Question	Walk days per week for at least 10 minutes				Walk time in minutes				Sitting time in minutes			
Weeks	B	8	16	24	B	8	16	24	B	8	16	24
Number (N)	36	28	28	28	36	28	28	28	33[1]	25[1]	28	28
Mean	**5.94**	**5.75**	**5.36**	**5.39**	**97.78**	**103.21**	**70.36**	**91.79**	**223.93**	**223.20**	**217.86**	**210.36**
Standard deviation	1.53	1.35	2.38	2.27	61.51	60.86	60.70	73.13	116.97	123.21	113.31	110.77

[1] 3 responses missing from this question

Figure 6.9 maps out four levels of physical activity: vigorous; moderate; walking; and sitting, across four time points. The figure shows that there was an increase in time (minutes) spent on vigorous physical activity between baseline (39) and week 16 (76) and then the time spent on vigorous physical activity plateaued (78). Interestingly, moderate physical activity levels declined from 78 minutes at baseline per week to 71 minutes by week 24.

For walking, there was a slight increase towards week 8, followed by a dramatic drop from over 100 minutes walking in a day to approximately 70. Week 24 saw the average go from 70 to approximately 90 minutes per day. Finally, the average time spent sitting declined steadily over the 24 weeks, finishing with a reduction of 14 minutes per day, across all sites.

Figure 6.9: Mean time spent on vigorous PA, moderate PA, walking and sitting at baseline, week 8, week 16 and week 24

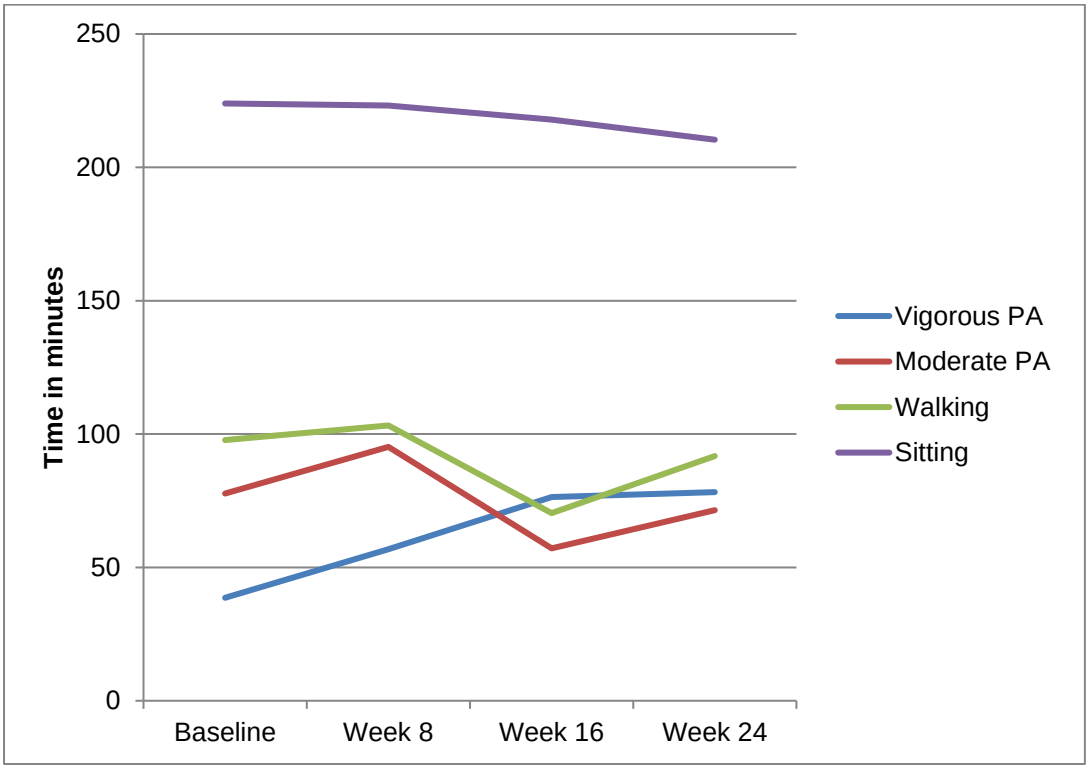
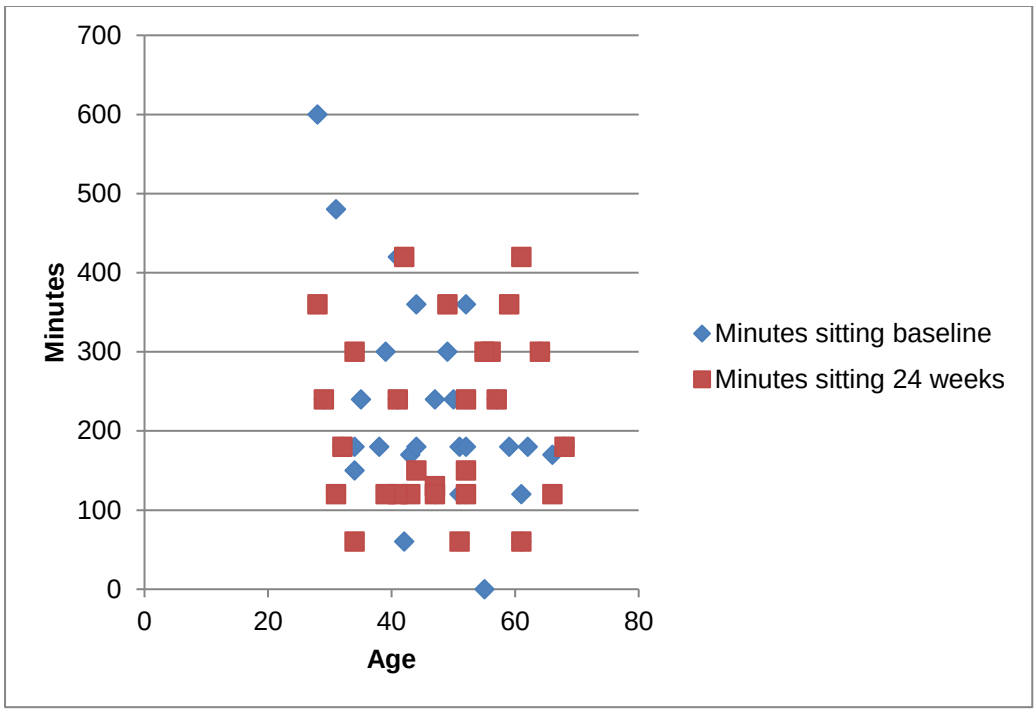


Figure 6.10 shows that there is no association between the age of participants and how many minutes they spend sitting. There does not seem to be an obvious trend in a decrease of sitting time after week 24, which figure 6.9 suggests, indicating that the means have been skewed by a small number of highly sedentary individuals at baseline.

Figure 6.10: Number of minutes spent sitting down during a weekday across the ages, at baseline and week 24



6.5.7 Quality of Life

The first question in the SF-8 asked participants: '*Overall, how would you rate your health during the past 4 weeks?'* Table 6.16 shows that there was the slightest of increases for both the PCS and MSC from baseline to week 24. Surprisingly, there were was a drop in vitality and the sub group having the biggest positive impact was social functioning with a jump of three points.

Table 6.16: SF- 8 mean results for individual components and overall physical and mental components for males, females and whole sample

SF-8	Overall mean		Male		Female	
	Baseline (n = 36)	*Week 24 (n = 28)*	*Baseline (n = 21)*	*Week 24 (n = 15)*	*Baseline (n = 15)*	*Week 24 (n = 13)*
Physical Functioning (PF)	43.60	45.15	42.57	44.49	45.04	45.92
Role Physical (RP)	44.39	43.65	42.91	41.48	46.47	46.14
Bodily Pain (BP)	48.38	49.26	48.43	47.62	48.32	51.15
General Health (GH)	45.53	46.45	44.59	45.64	46.85	47.38
Vitality (VT)	49.38	47.03	49.80	47.04	48.79	47.03
Social Functioning (SF)	43.85	46.63	40.70	43.28	48.26	50.49
Role Emotional (RE)	42.44	42.86	40.48	39.89	45.20	46.29
Mental Health (MH)	45.17	45.21	42.96	42.21	48.26	48.68
Overall PCS	45.34	45.72	44.70	44.47	46.24	47.18
Overall MSC	44.99	45.01	42.51	41.52	48.47	49.04

Abbreviations: PCS = Physical Component Summary, MCS = Mental Component Summary, PF = Physical Functioning

Table 6.17 shows the variance in health between the sites at baseline, with Leeholme showing worse general health compared to Barnard Castle. With social functioning, all sites except from Barnard Castle highlighted a positive change from baseline to week 24 with a jump of between two and three points. This correlates with the fact that out of the four sites, the site that was the most established with resources at the start of the intervention was Barnard Castle, and that the sites with higher deprivation levels reported a bigger improvement in social functioning.

Table 6.17: Differences in SF8 mean scores at baseline and 24 weeks between the four community gardening sites

SF-8	Leeholme		Barnard Castle		Ferryhill		Horden	
	Baseline	*Week 24*	*Baseline*	*Week 24*	*Baseline*	*Week 24*	*Baseline*	*Week 24*
Physical Functioning (PF)	39.52	45.15	45.86	47.31	43.98	43.61	46.79	46.68
Role Physical (RP)	41.99	42.81	47.91	46.70	43.34	41.80	46.76	46.02
Bodily Pain (BP)	46.49	46.05	53.90	56.63	46.39	46.90	50.05	51.39
General Health (GH)	45.14	45.99	47.23	45.79	43.71	45.42	48.03	50.14
Vitality (VT)	52.59	49.02	50.58	51.66	46.14	44.80	49.80	45.38
Social Functioning (SF)	37.36	39.26	49.89	49.98	44.36	46.56	46.98	52.28
Role Emotional (RE)	39.95	40.06	48.91	49.55	40.52	39.99	44.05	46.43
Mental Health (MH)	40.62	43.46	53.05	53.74	42.43	40.41	49.99	50.32
Overall PCS	43.68	44.66	48.10	48.52	44.30	44.41	47.28	47.36
Overall MSC	41.44	41.83	53.59	54.44	41.67	40.52	48.87	50.20

Through the data input process, it appeared that not one questionnaire had any missing SF-8 items. This suggests excellent data quality, as well as supporting the argument that the questionnaire is easy to understand and complete.

6.6 Study Two: Interpretation of Findings

6.6.1 Recruitment and Retention

With regard to the recruitment of participants into '*Nourishing Neighbourhoods'*, 41 people expressed an interest in taking part in the intervention, with 36 participants starting in the Summer of 2016 (88 % retention from expression of interest to project start). Five participants showed an initial interest in the project but decided not to take part because of work commitments (n = 3); because it wasn't the kind of project they thought it would be (n = 1); and because of a health issue preventing involvement (n = 1).

The ability to successfully recruit and retain research participants is an important precursor to conducting a successful study (Tong *et al.,* 2010). Research globally is threatened by declining participation rates and misconceptions about clinical research (Kaitlin, 2008). The ability to reach out to specific target study populations is a distinguishing trait of successfully conducted studies. Many research studies use innovative recruitment methods such as outreach programmes instead of simply using the conventional methods of advertising and doctor recruitment and referral. One lesson from this is that the use of a variety of recruitment strategies tailored to the different communities can yield good results. With '*Nourishing Neighbourhoods'* this was achieved using a combination of advertisements in local newspapers, word of-mouth, invited group-recruitment presentations at different organisations, flyers, and the use of social media such as Twitter and Facebook.

Community outreach and involvement can also help bolster recruitment rates (Viswanathan, 2004). A review on Community-based Participatory Research conducted by Viswanathan indicated that studies that featured community involvement often had improved participation rates. This improvement in recruitment rates can be partly attributable to the fact that members of the community are better able to advise on the most effective ways to approach community members. In addition, community participants are also able to provide greater access into the communities being researched, improve the comprehension of the information provided to the participants as well as enhance the reputation of the researchers (Staley, 2009). As part of the recruitment process with this study, key contacts within local organisations were utilised to engage with the community, to act as a gatekeeper, and to advise me as the researcher as to the best way to recruit individuals in each particular setting.

In terms of numbers, this research didn't attract high volumes of participants. However, the number of those who remained engaged for the duration of the intervention show that ensuring an intervention is community focussed increases the chances of retention and adherence success.

6.6.2. Adherence

Out of the 36 participants, 28 were still engaged with the programme at week 24; an adherence rate of 78 %, showing that adherence to the community gardening intervention was strong. Participants who dropped out of the programme did so by week eight, with no drop out recorded after 56 days. This is an interesting finding, as it highlights the importance of the early days

of an intervention, and consistently engaging with it, to help the attendance become embedded as a habit.

As discussed previously in Chapter one, habits are behaviours which are performed automatically because they have been performed frequently in the past (Lally and Gardner, 2011). A behaviour that can be broken down into lots of components, for example, going for a run, takes longer to become autonomous than one that's made up of fewer components, such as drinking water with breakfast (Judah *et al.,* 2013). This suggests that an individual would need to invest more commitment initially for a complex behaviour, such as taking part in a community gardening intervention. Based on current scientific research (Lally and Gardener, 2011), it can be reasonably assumed that the formation of a habit takes an average of 66 days to achieve. The drop-out rate for engaging in '*Nourishing Neighbourhoods'* stopped after 56 days, which suggests that by week eight, participants had enabled the attendance at the weekly session to become a habitual behaviour that was being carried out without much afterthought, therefore reducing the possibility of excuses and barriers to hinder adherence.

With regard to the *'Nourishing Neighbourhood'* programme, the sessions took place once a week, with the flexibility for participants to attend in their own time if they wished. With hindsight, a useful piece of data to collect would have been how often participants visited the site in their own time, to see if there was any correlation with participants who engaged with the intervention longer. Although a limitation within this piece of research, this provides an area for further research in this field.

There was a difference in the age of participants who remained engaged with the intervention, with older participants more likely to engage with *'Nourishing Neighbourhoods'* over the six months. Historically, the older generation has been viewed as a 'hard to reach' group in terms of health interventions (WHO, 2015b). The results from this study suggest that this type of health intervention is one which is seen favourably by older people and could play an important role in tackling the growing pressures on health and social care systems from a global ageing population (WHO, 2015b).

Community gardening programmes, such as '*Nourishing Neighbourhoods'* have the potential to assist older people in building and maintaining their physical and cognitive function and can reduce the risks of disease and loss of independence (WHO, 2015b). The oldest old (people aged 80 years and over) is the fastest growing age group in the population (ONS, 2016), making them an important target for health interventions. Furthermore, this group is a diverse section of the population, ranging from relatively healthy, independently living individuals to very frail individuals with multiple diseases, poor physical functioning and cognitive problems, presenting unique challenges for undertaking research on health promotion (Jacelon, 2007), and thus they are often excluded from studies (Gaertner *et al.,* 2016). However, there is a growing body of evidence suggesting that the oldest old can gain substantially from various health interventions (Novak, 2016). Research in this field is limited however, with Liljas *et al.,* (2017) noting that no systematic reviews on the oldest old have to our knowledge considered a broad range of health promotion interventions within this area.

The findings from Study Two show that female adherence was 87 % compared to 67 % of males. Some research has shown that in a clinical setting, being female is a predictor of better adherence (Batterham *et al.,* 2008). However, after reviewing the health literature, to the best of my knowledge, there is no prior research that has provided evidence of gender differences in adherence with a community intervention, outside of a clinical setting. This in itself is an interesting finding, and to the best of my knowledge, is not something that has been considered before as an area to explore.

Ferryhill had the highest adherence at 92 %, and Leeholme had the lowest adherence rate of 60 %. These results are not surprising, with Leeholme ranking as the most deprived site of the four community gardens (Durham County Council, 2015). Tackling health inequalities is a long-term process. Low incomes, poor housing, unemployment, poor diets and a degraded living environment are recognised as contributing to poor health outcomes. Additionally, participants from more deprived backgrounds may have a poor understanding of the health benefits of community gardening. Interventions which promote physical activity can be effective in low income groups but have the potential to increase intervention-generated inequalities (Bull *et al.,* 2014), with preventative interventions more likely to be successful amongst the more affluent, a process which has been termed as the 'inverse prevention law' (Acheson, 1998). White *et al.,* (2009) argued that all processes in the planning and delivery of health promoting interventions have the potential to widen inequity between groups. In addition, Bonevski *et al.,* (2014) concluded through a systematic review that to tackle the

challenges of research with socially disadvantaged groups, and increase their representation in health and medical research, researchers and research institutions need to acknowledge extended timeframes, plan for higher resourcing costs and operate via community partnerships. The development of '*Nourishing Neighbourhoods'* in the future must consider the impact of deprivation levels on recruitment, retention and adherence, and ensure that the programme that is delivered is not a 'one size fits all'.

Attendance of participants throughout the six-month period was poorer when weather worsened. Gaining an understanding of the relationship between weather and health-related interventions has increased in importance with the burgeoning prevalence of physical diseases and mental ill-health. Elements of the physical environment are powerful determinants of health behaviours, thereby influencing population health (Humpel *et al.,* 2002) and have been categorized as "barriers", "facilitating conditions" or "contextual influences" (Godin, 1994). Furthermore, the effects of weather may interact with age, pre-existing disease conditions such as those named or others such as asthma, to exacerbate effects on physical activity. The weather cannot be changed, but knowledge of how weather conditions affect physical activity can help policy makers and providers of health care to adapt recommendations to mitigate its effects. The Chan and Ryan (2009) review stated that although there had been research into weather, it did not address the specific types of weather that are problematic, nor the magnitude of effect exerted by various weather conditions.

To date, the number of published studies is small but in general the data confirm the perception that precipitation has the largest negative correlation

with physical activity. So far, all research to date has been observational studies; thus, causation is inferred but not proven. Further research is needed, looking at how *'Nourishing Neighbourhoods'* can take weather into account when developing the sessions and materials. For the data collected in Study Two, weather noted for a session was labelled as 'not favourable' if it was windy, raining, cold, or a combination of the three. Using those 'unfavourable' labels, session planning can consider a variety of difficult climate experiences. Work that has already been carried out includes preparing alternative indoor activities and emphasizing the need for protective clothing and proper footwear.

Finally, the limited data suggests that individuals in an intervention may be motivated to continue despite inclement weather (Chan and Ryan, 2009). This was certainly true for several participants who engaged with the programme. Responses included reasons such as enjoying colder weather, to feeling motivated because of the volume and success of previous work on site, which acted as a driver for attendance.

6.6.3 Changes in Fruit and Vegetable Consumption

There was an increase in fruit and vegetable consumption, up to six portions a day of fruit and vegetables, from baseline to week 16. This is consistent with the research carried out by Haim *et al.,* (2009) and Alaimo *et al.,* (2008), which showed that involvement with community gardening equated to a healthier diet and healthier body weight. However, there was a drop in consumption at week 24, back to five portions of fruit and vegetables, which is not consistent with previous findings. One possible answer to this

decrease in portions, following the increase by week 16, could be the time of year when the intervention ended, and data was collected. Week 24 data was collected in January 2017, just after the festive period. This is discussed in further detail in section 6.6.4.

Unusually, there was a decrease in knowledge around the recommended amount of fruit and vegetables to eat every day, with 11 % reporting they did not know at week 24, when the baseline figure was 0 %. This contradicts findings from Spears Lanoix *et al.,* 2015, that participation in a gardening intervention increases knowledge about fruit and vegetables. Part of the '*Nourishing Neighbourhoods'* intervention discussed what the official government guidelines were of five portions a day (NHS Choices, 2015), however, there was also a lot of discussion and debate amongst sites about the ever changing message received from the media about portions, such as moving from five to seven (Oyebode *et al.,* 2014), and more recent headlines discussing ten a day (Aune *et al.,* 2017). This extended into confusing messages in general about nutrition, macronutrients and what we should be eating to maintain a healthy lifestyle and weight. A specific topic which was touched upon was the move from media messages reporting about not eating too much carbohydrate or talking about too much sugar. This reduction in knowledge about what is the official recommended amount of fruit and vegetables per day is possibly linked to the volume and change of information that is reported in the media (Nagler, 2014).

Although nutritional education took place within the sessions, further work is needed to help change eating habits from a young age and within schools. Jamie Oliver has been at the helm of driving change in schools (Oliver, 2018)

with the argument that it is the environment and access to fresh fruit and vegetables that needs to be addressed. Schools need to have gardens, so that they can access their own fresh fruit and vegetables. For it to become the norm, long term changes are required to alter the culture. By developing behaviours which will avoid negative eating habits from a young age, the cost at attempting to change these habits later in life will be reduced.

Interventions such as *'Nourishing Neighbourhoods'* could be used as an educational tool, as suggested by Kransy and Tidball (2009). In addition to changing eating behaviours, other benefits include developing skills and knowledge of how to grow produce and how to cook it, building structures to support growing, knowledge about nutrition and craft making. This in turn is likely to see an increase in participants pride, confidence and self-worth (Dolon *et al.,* 2011; Bendt *et al.,* 2013).

6.6.4 Changes in Body Mass Index

Participation in '*Nourishing Neighbourhoods'* had a positive impact on the BMI scores of participants from baseline to week 16. This is consistent with the findings of Park *et al.,* (2008) who found that gardening leads to the maintenance of a healthy body mass. A healthy body weight can have several beneficial effects; a reduced risk of obesity and associated ill health, heart disease and diabetes (Wing *et al.,* 2011). However, data from week 16 to week 24 showed an increase in BMI scores, so that BMI was reported as not changing over the course of the intervention, which supports the findings of Soga *et al., (*2017) that BMI did not differ between gardeners and non-

gardeners. Week 24 data was collected just after the Christmas period, which may have potentially influenced participants weight.

Understanding vulnerable times for weight gain throughout the life cycle is an important aspect to consider when delivering health interventions which look at physical activity levels and nutrition. A number of time periods, including adolescence (Alberga, 2012) pregnancy (Gunderson *et al.,* 2004) and mid-life in females (Kapoor *et al.,* 2017) as well as marriage in males (Bove and Sobal, 2011) appear to be time periods were individuals are more likely to gain weight. Other lifestyle changes, such as smoking cessation (Aubin *et al.,* 2012) or immigration to a more highly urbanised culture (Lindberg and Stevens, 2011) can also be associated with weight gain.

The Christmas period presents a scenario with a higher risk of increasing calorific intake due to the increased availability of high-calorie foods, increased time pressures and stress, and a decrease in opportunities to exercise (Marlatt & Gordon, 1985). Even with this high-risk scenario presented, there has only been a handful of studies which have explored the notion that people are more vulnerable to weight gain during the festive period. With the limited research that has taken place, mainly in the U.S., it is unknown whether the weight gain observed in long-term observational studies of adults is due to a small, steady increase in weight throughout the year, or because of the increase in energy intake and decrease in energy expenditure over the festive period.

To date, there has been no research in the UK which has looked at the suggestion that weight gain occurs over Christmas and New Year. The NHS

has a webpage for people to view which explains how to ‘Avoid winter weight gain’ (NHS Choices, 2017). In the lay press, winter holiday-related weight gain has been the subject of many reports, which often contradicts published research.

Some studies have examined weight changes over the festive period and have suggested that obese or reduced-obese individuals may be most susceptible to weight gain in the festive season. Yanovski *et al.,* (2000) reported a mean weight gain of 0.37 kg in a sample of 195 adults. The risk of gaining at least 2.3 kg was higher for obese individuals. Andersson and Rossner (1992) compared weight changes over the festive period in reduced-obese patients in a hospital-based weight loss maintenance program and a control group of hospital staff. Both groups gained an average of 0.5 kg over the holidays; however, the variation in weight change in the reduced-obese patients was far greater and ranged from a gain of 6.1 kg to a weight loss of 8.8 kg. Thus, overweight and obese individuals and those individuals who have lost weight may be more susceptible to this high-risk period.

The results in this study showed an average reduction from a score of 27 to 26 between baseline and week 16. By week 24, the BMI score increased to 27. Although this is only a small change, it is worth noting that if a health intervention measuring weight was to finish over the festive period, and into the New Year, there is the potential negative impact of disengaging participants if they are finishing a programme with an increase in BMI. It also highlights the limitation of delivering an intervention over a six-month period rather than a 12-month period. Especially when it comes to an intervention

that is delivered outdoors. These findings indicate that the time of the year that people engage with a community gardening programme is of importance. Seasonality must be taken into account when devising such an intervention. These findings should be utilised when looking at start and finish times for health interventions which look at measuring weight loss.

Results also showed that the BMI of female participants who dropped out of *'Nourishing Neighbourhoods'* by week 8 was higher (27) than those who stayed engaged with the programme (25). To the best of my knowledge, there are no other studies which have explored the link between BMI and drop-out rate in a community gardening intervention. A study by Ortner Hadziabdic *et al.,* (2015) looked at 124 obese patients in a 12-month weight reduction programme. The primary outcome measures included drop-out rate and percentage weight loss. The patients most likely to drop out were those with a lower educational level and a higher level of obesity. Although this research is not exploring drop-out rates of a community gardening programme, it shares some insight into what might be a predictor of drop out in a health intervention which encourages changes in physical activity levels and nutrition.

6.6.5 Changes in Physical Activity Levels

Participation in the '*Nourishing Neighbourhoods'* programme led to an increase in some forms of physical activity, but a reduction in others. Results showed a decrease in the time (days and minutes) participants were engaged in moderate physical activity, and the days and minutes spent walking. However, there was an increase in the days per week and the

number of minutes spent every day where participants carried out vigorous physical activity. In addition, the time spent sitting by participants was reduced from baseline to week 24 of the intervention. The reduction in moderate physical activity and walking has potentially occurred due to the increase in vigorous physical activity, which then balances each other out.

Costs to the NHS from illness associated with physical inactivity are reported at around 1.8 billion per year and total costs associated with inactivity in County Durham are estimated to be over £19 million per 100,000 population (UK Active, 2014). Exercise referral services have existed since the 1990's, having emerged as one way for primary care professionals to promote physical activity for patients with conditions such as cardiovascular disease (CVD). They are commonly commissioned to provide access to structured exercise programmes with advice from professionals, however it has been suggested that the success of such schemes be limited as they often suffer from poor participation and adherence to physical activity; and often only demonstrate short term benefits (Sallis *et al.,* 1989; Morgan, 2005). Although the results from this study are limited in the fact that the intervention lasted for six months, the retention and adherence rates were strong. There is an opportunity here to take advantage of a health intervention which has the potential to retain participants longer than a generic exercise referral programme would do. Although changes in physical activity may not happen overnight, the fact that participants are engaged in a programme that promotes physical activity at all levels, I believe there is strong support to suggest that over a longer period of time, community gardening programmes

could be instrumental in changing health behaviours relating to physical inactivity and sedentary behaviour.

Based on the research presented, it appears that participation in '*Nourishing Neighbourhoods'* has the potential to get people more physically active, and although not always achieving CMO recommended levels there are likely to be health benefits associated with this (NICE, 2014).

No differences in physical activity levels were found between age groups, genders or between the four intervention sites.

6.6.6 Changes in Self-Reported Health and Quality of Life

There was a small positive change reported by participants from baseline to week 24 in the SF-8 survey, on both the Physical Component Summary (PCS) and the Mental Component Summary (MCS).

When using triangulation to compare the data collected in Study Three with the data collected from the survey, it was evident that some result components were supported, and others not. In general, the changes were so small on a component level, that they are not suggestive of community gardening having a positive impact on self-reported health and quality of life. This was the case for all components except for social functioning. This improved by three points for both males and females across three of the four sites. The site at Barnard Castle did not see an increase in social functioning. This result is interesting, as Barnard Castle had the site that was most established with resources and infrastructure. The other three sites were in areas with higher levels of deprivation and had sites that were the least

developed. This suggests that the very act of having to invest more time and energy into developing a community gardening site helps to establish a higher level of social functioning amongst the participants, as the project acts as a situation that bonds people together and brings a common community goal to work towards. Community capacity may be regarded as a crucial variable mediating between the activities of health promotion interventions and population-level outcomes. Several dimensions of community capacity have been identified, among them skills and knowledge, leadership, a sense of efficacy, trusting relationships, and a culture of openness and learning (Easterling *et al.,* 1998).

6.6.7 Financial Analysis of Nourishing Neighbourhoods

The total cost for delivering the intervention was £10,323.80. As explained in chapter six, this covered a member of staff delivering a weekly community gardening programme in four local communities in County Durham for six months. At baseline, the programme worked out at £286.77 per head. Following on from participant drop that figure rose to £368.70. This finding suggests that the scheme is relatively inexpensive.

A recent systematic review by Masters *et al.,* (2017) looked at 52 studies covering Public Health services in the UK, western Europe, U.S., Canada, Japan, Australia and New Zealand. For every £1 that was invested in public health, £14 was returned into the wider health and social care economy. There was a range on return of investment, from £4 to £46.50, with some returns seen within 6-12 months. In this current climate, at a time when organisations are continually looking for savings and ways to work more

efficiently as well as use the resources that they have in communities, the community and voluntary sector are ideally placed to deliver interventions with a community focus. Interventions such as *'Nourishing Neighbourhoods'* could potentially tap into community capacity for delivering a fairly inexpensive intervention. However, they need to be empowered and equipped with the right resources to be able to do this.

What was not examined in this thesis was the direct cost for participants to attend the *'Nourishing Neighbourhoods'* programme. This could have included travel costs, clothing and footwear, etc. Some participants brought resources to the site out of their own pocket. I also was not able to calculate any savings participants made. For example, there could have been savings from produce harvested which may have reduced food bills. A possible development for future research would be to carry out an actual cost benefit analysis of an intervention such as '*Nourishing Neighbourhoods'*- with a comparison of costs running it as volunteers; a local authority; and a private company, to see the variation in cost.

6.6.8 Informing a Future Trial

The number of individuals to include in a research study, i.e. the sample size of a study, is an important consideration in the design of many clinical studies. Several basic factors help to determine an appropriate sample size. Sample size is closely tied to statistical power, which is the ability of a study to enable detection of a statistically significant difference when there truly is one. A trade-off exists between a feasible sample size and adequate statistical power.

It was accepted at the beginning of this PhD journey that there was insufficient resource to be able to examine community gardening with a large enough sample size that would give sufficient power. However, an objective was to collect data that would inform the sample size required for a future trial. Using a sample size calculator (Creative Research Systems, 2012), a confidence level of 95 % and a margin of error at 5 %, looking at the population of County Durham of 517,800 (ONS, 2106), a sample size of 384 participants would be required to achieve statistical power.

Based on the average number of participants that were recruited and adhered to the '*Nourishing Neighbourhoods'* intervention (41 recruited; 28 adhered), we are left with an average figure of 10 participants recruited per site, and 7 participants who engaged for six months. If the average figure for adherence in this research is seven, then it can be reasonably assumed that to achieve power, there would need to be 55 community gardening sites involved in a multi-site RCT, with a minimum of 550 participants recruited at the baseline phase.

However, I would now argue that the findings presented in this thesis suggest that what works for one community gardening site does not necessarily work for another. At the beginning of this research journey, I believed that it was essential to be able to replicate this research into a large scale multi-site RCT. Not only would this be extremely difficult to co-ordinate and very expensive, the number of variables that each community gardening location would encounter would make it difficult to compare one site to another in a like for like fashion.

6.6.9 The Potential for Community Gardening Interventions to Address Health Inequalities

There is the potential for health interventions to widen health inequalities rather than reduce them (White *et al.,* 2009). Although the four community gardening sites were situated in areas of social deprivation, and therefore an intervention for those who are most at risk of poor health in our society (Townsend and Davidson, 1982), the 'Inverse Care Law' (Tudor Hart, 1971) suggests that the most socio-economically deprived communities will have the least access to health promotion services (Wright, 1997). Data was not collected on participants socioeconomic status, therefore it is not possible to infer that the participants who engaged with *'Nourishing Neighbourhoods'* were those at the lower end of the inequality spectrum. However, the sites were located within one mile of participants, so it is more than likely that the majority of participants came from deprived locations.

The quantitative data supports the argument that a community gardening intervention is important as it is able to do things that other community based interventions have struggled to do so far.

- The intervention started with a six month programme. This provides a time period where the opportunity for habit formation is provided, and is not just seen as a flash-in-the-pan intervention.

- The intervention allows the opportunity for participants to take control and responsibility at the end of the six months. The potential positive health outcomes which can be experienced through community gardening (discussed in greater detail in chapter seven) can empower

participants to take on such a responsibility, and therefore lead to a higher chance of sustainability. This is something which community based interventions have struggled with, as often, project staff who work on a voluntary basis cannot maintain commitment over time (Belizan *et al.,* 2019).

- This allowed a high retention rate of 78 % across all four sites. Good adherence improves the effectiveness of interventions aimed at promoting healthy lifestyles (Rapoff, 2009). When interventions are complex and require lifestyle changes, nonadherence can be as high as 70 % (Dishman, 1982, Kravitz *et al.,* 1993). In comparison, this intervention is achieving a much higher percentage, which suggests it will improve the effectiveness.

- The community gardening intervention was enjoyed by a wide range of ages, but was able to reach and engage with the older population. This is an age group that is historically hard to reach (WHO, 2015b)

Out of the four sites, Leeholme, the site with the highest deprivation levels, had the lowest adherence, with 60 % of participants completing the six month intervention. However, Ferryhill, which came second to Leeholme for deprivation levels, had an adherence rate of 92 %. This suggests that a community gardening intervention might have the potential to reach those who suffer from the poorest health. Those who have low incomes, poor housing, are unemployed, and have a poor diet are more likely to have poor health outcomes, but community gardening has the potential to have a positive impact on multiple health inequality issues.

Exploring community gardening as a complex public health intervention: an action research study

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CHAPTER SEVEN: NOURISHING NEIGHBOURHOODS; EXPLORING THE NARRATIVE

7.1 Introduction

Following on from the quantitative findings presented in the previous chapter, chapter seven presents the qualitative data collected through pre and post-intervention focus groups with a sub-sample of participants in *'Nourishing Neighbourhoods'*. It also combines these data with auto-ethnographic accounts that I, in the dual role of deliverer and evaluator of the intervention, produced following on from the 24 sessions delivered on each of the four community gardening sites. I finish the chapter with establishing links between the results described within the scope of existing literature discussed in chapters one through to five, with findings organised as they relate to the thesis aims and objectives.

7.2 Aims and Objectives

7.2.1 Aims

The aim of Study Three was to explore the implementation of the intervention- was it acceptable and feasible in County Durham, and what are the key components of successful community based interventions? A secondary aim was to understand the factors impacting on health and wellbeing amongst participants in a community gardening intervention in the North East of England.

7.2.2 Objectives

For Study Three, the primary outcomes were:

- To identify positive and negative outcomes that are perceived to directly result from, or reportedly related to, taking part in a community gardening programme and its evaluation
- To identify any unintended consequences to taking part in a community gardening programme and its evaluation
- To enhance understanding of the barriers to engaging with a community gardening programme
- To establish practicalities required to inform, deliver and evaluate a successful community intervention in the future
- To explore the process of completing the evaluation measures used in '*Nourishing Neighbourhoods'*

7.3 Methods

7.3.1 Study Setting

There were four sites in total engaged with this intervention: Barnard Castle; Horden: Leeholme; and Ferryhill. The selection of the sites has already been discussed in detail in chapter six in terms of locality and accessibility.

7.3.2 Recruitment and Sampling

Again, the recruitment and sampling for this study was outlined in chapter six, as Study Two and Study Three ran simultaneously. Once signed up to the community gardening project, potential participants were invited to take part in the evaluation of the intervention. They were provided with verbal information about the study prior to being given additional evaluation information sheets and consent forms. All of the participants who signed up for the '*Nourishing Neighbourhoods'* programme also agreed to participate in the evaluation of

'*Nourishing Neighbourhoods'*. Participants then signed the necessary consent form, whilst the researcher explained that the focus groups would be recorded to allow for transcription and analysis at a later date. Data were only collected from those who agreed to take part in the evaluation and met the inclusion criteria set out below.

Inclusion criteria

1. Aged 18 years or above;
2. Ability to give informed consent;
3. Living within County Durham and within one mile of a community garden site.

Exclusion criteria

1. Under 18 years old;
2. Unable and/or unwilling to give informed consent;
3. Living more than one mile away from a community garden site.

Additionally, participants were not excluded if they did not attend all 24 sessions of the intervention. Also, it was not deemed necessary to include 'the ability to read and write in English' in the inclusion criteria due to the demographics of the communities. Table 7.1 shows the characteristics of the participants. Not all categories matched the number of participants who completed the quantitative data. Although 28 participants were engaged with '*Nourishing Neighbourhoods'* until the end of the programme, only 26 took part in the follow-up focus group. One had to leave after filling in questionnaires after a home emergency, and one had to leave due to a doctor's appointment.

Table 7.1: Participant characteristics

	Initial		**Follow-up**	
Site	*Male*	*Female*	*Male*	*Female*
Barnard Castle	2	4	2	3
Ferryhill	8	5	6	5
Horden	2	5	1	4
Leeholme	9	1	4	1
Sub-totals	21	15	13	13
Total no. of participants	36		26	

7.3.3 Data Collection

Focus Groups

Participants were invited to take part in an initial semi-structured focus group (pre-intervention) and a follow-up focus group after 24 weeks (post-intervention). Focus groups took place at each community garden, one week prior to each site starting (pre-intervention) and within one month of the programme finishing (post-intervention). The focus groups took place either outdoors on the actual site or if the weather was poor, they took place indoors at a community venue on or within close proximity of the site. Before each focus group began, I explained what was involved and confirmed that all participants were willing to participate. Pre and post-intervention focus groups were used to be able to look at opinions and attitudes before the '*Nourishing Neighbourhoods'* programme to see if these had changed during the course of the 24 weeks. When deciding on the data collection method, options other than focus groups were explored, such as interviews, surveys and observations. However, the focus group has several advantages.

Focus groups allow discussion and debate, where ideas can snowball, and new lines of thinking can be explored. Focus groups are an efficient use of

time, as interviews can be time-intensive. Additionally, they have the benefit of being relatively inexpensive. Furthermore, individuals have the opportunity to provide honest and open responses, whilst participants build on each other's discussion through "piggybacking". Focus groups allow the researcher to look beyond the numbers that might be obtained via surveys and questionnaires. Researchers can learn or confirm the meaning behind the facts (Krueger and Casey, 2009; Mansell *et al*., 2004). Focus group methodology has its limitations. Louder individuals can sometimes overpower discussion, and the focus group relies on assisted discussion to produce data. Therefore the facilitation of the discussion is critical (Leung and Savithiri, 2009). I attempted to overcome this limitation by making a conscious effort to invite all participants to have a say throughout the course of the focus group. I also made good use of the topic guide that was prepared to aid the focus group, using prompts to bring other participants into the discussion, and to keep within any time constraints.The impact and experiences of the intervention on participants was explored.

Findings from the focus groups in Study One were incorporated into the pre-intervention topic guide (Appendix W). This allowed me to continue along the initial lines of enquiry and to build upon the initial findings (Kreuger and Casey, 2009). A topic guide was created for the post-intervention focus groups (Appendix X) by using the data collected in pre-intervention focus groups, and the observations I had made and recorded in a diary. The focus groups were used to examine overall perceptions of the intervention and engagement with different intervention components. Other topics that were covered included: exploration of how the different intervention components were implemented;

recruitment; retention; adherence; which elements were perceived to work well; perceived benefits of the intervention; the measures used to collect data during the intervention; and ideas for further development. The length of focus groups (n = 8) ranged between 28 and 54 minutes. Focus groups were an average of 42 minutes, and were audio recorded to allow for transcription by me. The number of participants ranged from five to 13. This difference in numbers had a noticeable impact on the dynamics of the discussions. The focus groups with larger numbers tended to have more dominant characters reveal themselves rather than in the smaller groups which appeared to have a more equal input from participants. I worked to overcome this by trying to engage with all participants, and again, making a conscious effort to note those who were a little bit quieter and not contributing as much. I then made sure I invited them to give their thoughts on various topics.

Auto-Ethnography

A description of ethnography and its merits was provided in chapter three to provide a rationale for the research approach adopted. Auto-ethnography was used as part of the data collection process in Study Three. Ellis *et al.,* (2011, page 1) described auto-ethnography as:

> *"An approach to research and writing that seeks to describe and systematically analyse personal experience in order to understand cultural experience. This approach challenges canonical ways of doing research and representing others and treats research as a political, socially-just and socially conscious act. A researcher uses tenets of autobiography and ethnography to do and write auto-ethnography. Thus, as a method, auto-ethnography is both process and product."*

Throughout the delivery of '*Nourishing Neighbourhoods'*, I took the time after each session to make some notes in a reflective journal. These notes were unstructured, and I wrote down observations on conversations, behaviour of participants, personal reflections, and things for me to think about in the future delivery and evaluation. These notes have been included within the research as they provide valuable insights that have been used in addressing the research questions. Through auto-ethnography, I was able to explore personal experiences in relation to the communities I was working with and observing (Ellis *et al.,* 2011), taking into account wider social structures (Cook, 2014) such as age, class, education levels, employment status and disability. The notes included personal feelings and experiences, observations of interactions and activities, as well as thoughts for me to ponder throughout the intervention process.

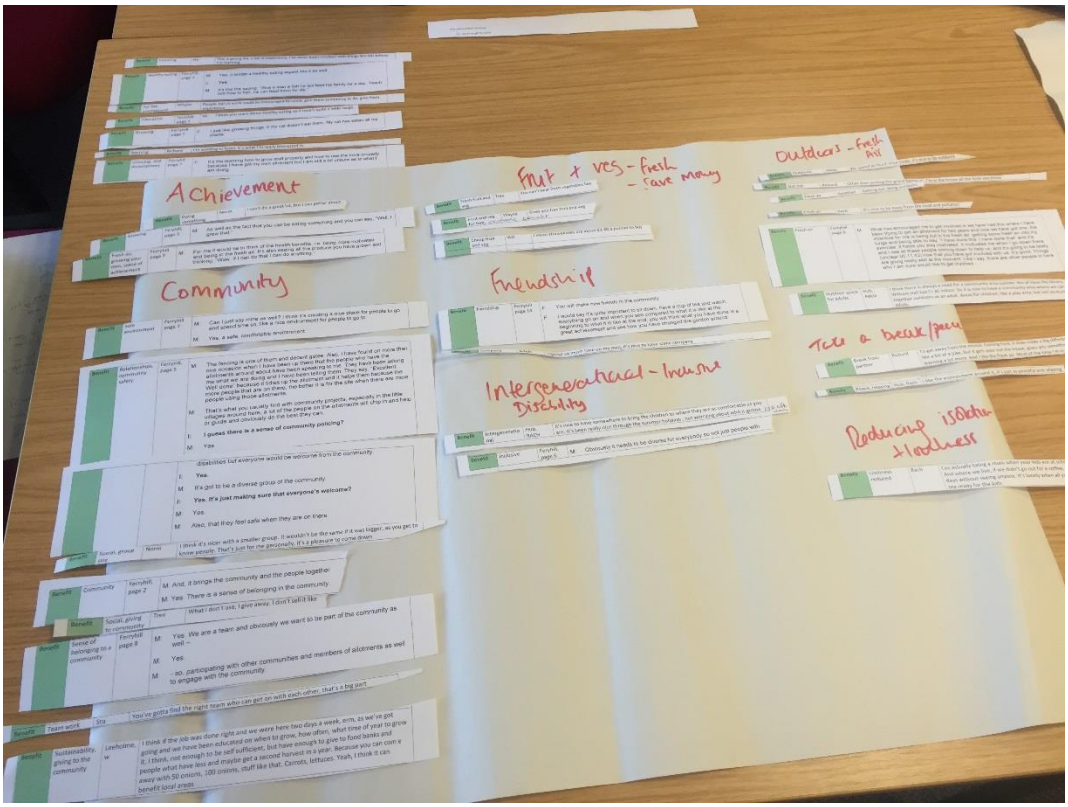
7.3.4 Data Storage and Analysis

NVivo (version 10) was initially used to manage the qualitative data generated through the focus groups, which were then analysed using thematic content analysis (Braun and Clarke, 2006), which I describe in detail later in the chapter. Although the data were initially managed within Nvivo, I made the decision to analyse the data manually rather than using computer software. This was to ensure that the chance of missing data was reduced, as I did not feel as confident using the software, and therefore increasing my confidence in the results. Using software packages can be viewed in a reductionist light, leaving little room for innovation or creative interpretation (Seidel, 1991). I also found that after attempting to use NVivo, I struggled to familiarise myself with the data, and felt that my understanding of the data was diminished as a result.

Strauss (2003) argued that qualitative software can be seen as trying to squeeze the qualitative dynamics into the quantitative boxes, in which they sometimes fail to connect. I agree with Strauss, and on a personal level, trying to look at codes on a computer screen rather than out in a big open space with flip charts and wipe-boards had a negative impact which stunted any innovative thinking, and also reduced the opportunity I had as a researcher to see something out of the box. The auto-ethnographic data collected in the journals was not uploaded into any software and was also analysed manually.

I followed Braun and Clarke's (2006) six phases for thematic analysis to create themes and codes. Phase one is familiarisation with the data. This was achieved by personally transcribing all of the audio files, which allowed me to immerse myself in the data early on. Once I had completed the transcription phase, I moved onto the generation of initial codes, which is phase two (Braun and Clarke, 2006). This was achieved by reading the transcripts repeatedly to achieve immersion and obtain a sense of the whole (Tesch, 1990). I highlighted key words that captured thoughts or concepts.

Figure 7.1: Searching for themes, and identifying potential categories



The third phase is searching for themes (Braun and Clarke, 2006) which can be seen in Figure 7.1, where I sorted all of my initial codes into categories, or potential themes. I began to construct a thematic map at this point (see Figure 7. 2) to help me envision how my themes were coming together, and how they were connected.

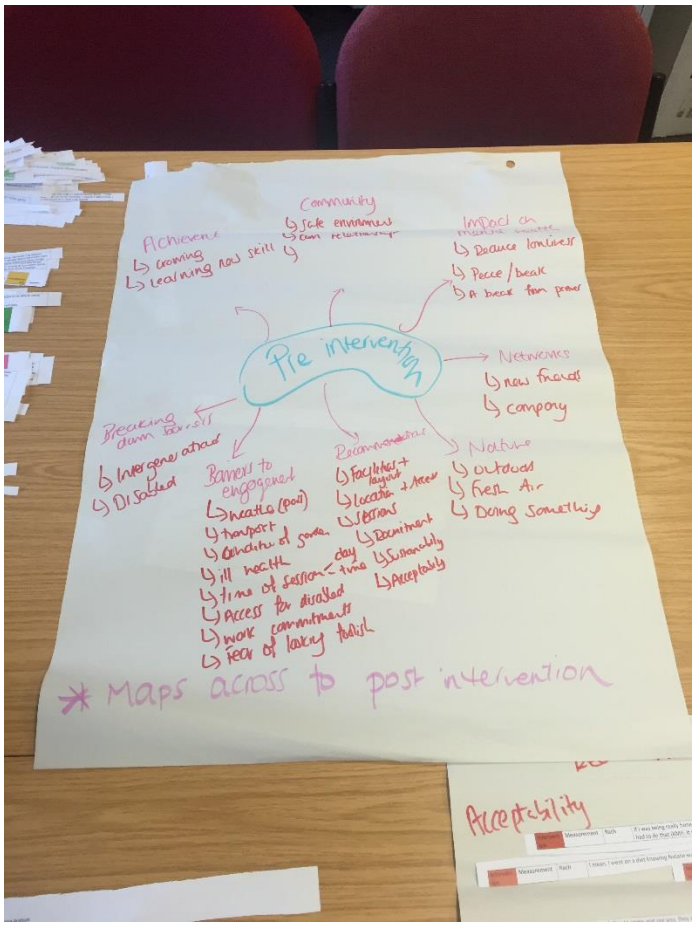


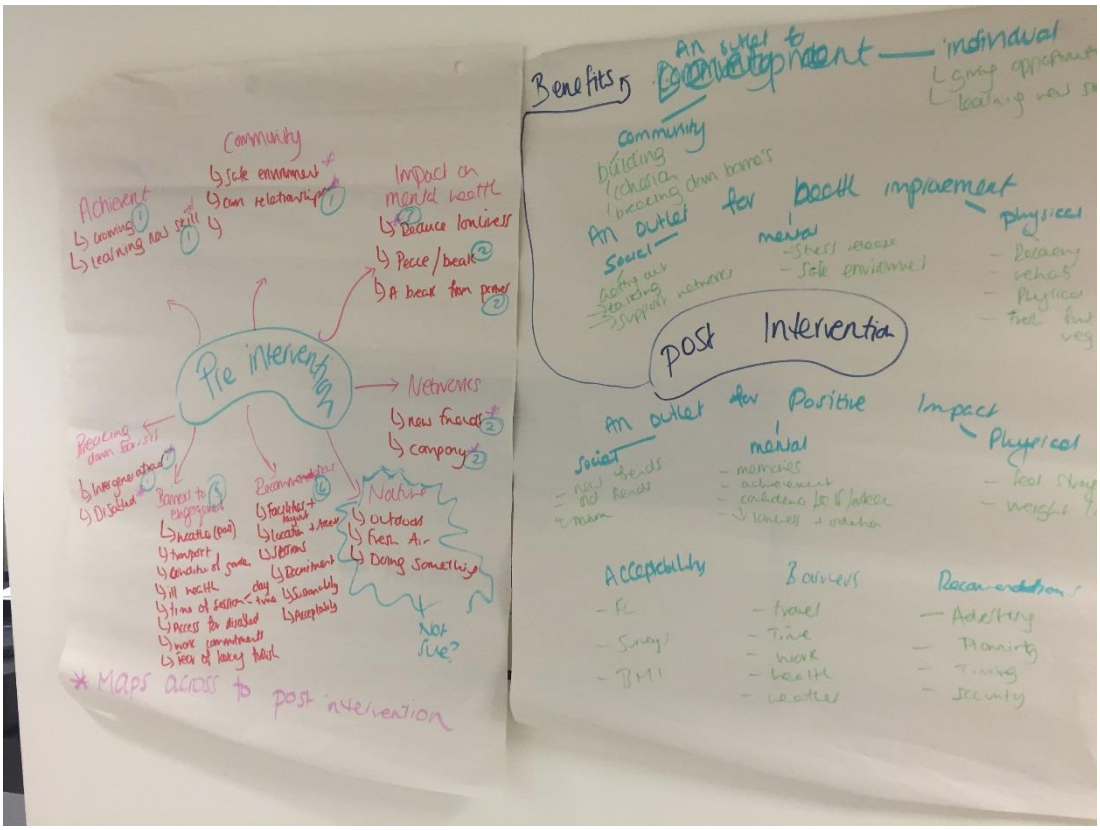
Figure 7.2 Constructing a thematic map

Phase four consisted of reviewing themes and refinement of my themes, and recoding if needed (Braun and Clarke, 2006). This was something that I carried out multiple times, as there were either sub-themes that would not fit under a general theme, or sub-themes that linked into a variety of themes. I revisited the transcripts again and considered the themes simultaneously to ensure I

did not miss or misunderstand any meaning within the data. This step ensured validity by making sure that the themes found reflected the whole dataset (Braun and Clarke, 2006).

Phase five included further refinement, in addition to defining the themes that emerged (Braun and Clarke, 2006). At this stage I began to put a title to each theme and sub-theme that had emerged during the initial and follow-up intervention focus groups, as well as themes that had arisen at both time points (Figure 7.3).

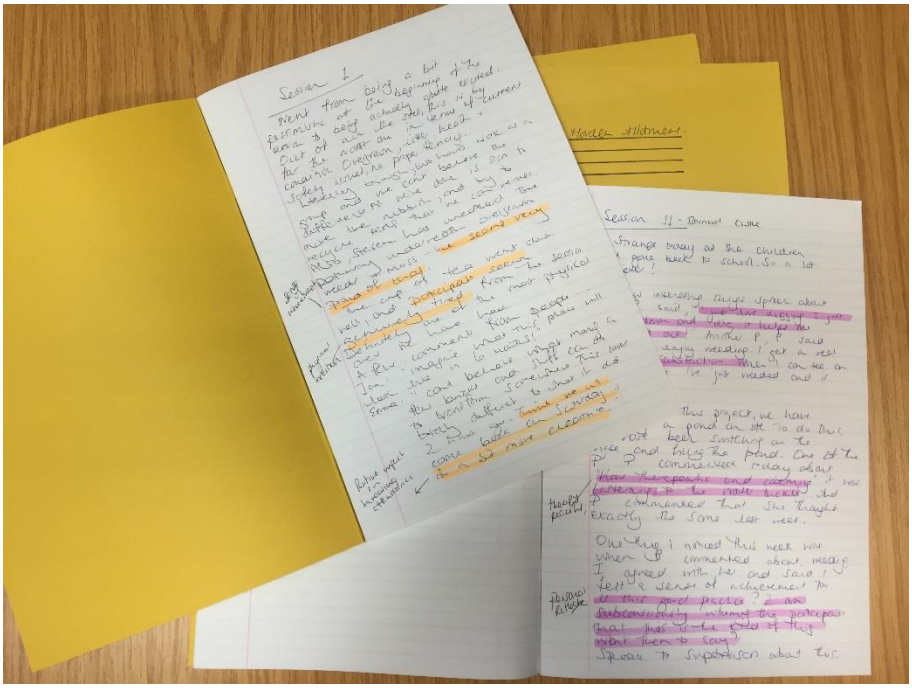
Figure 7.3 Identifying themes and sub-themes from the raw data and mapping them between pre and post-data collection



Lastly, phase six was the development of the final themes, which are reported later in this chapter.

As part of the analysis, I spent time reading and re-reading my journal entries across the four sites I worked on. This process was very similar to the coding process with the transcripts, using margins to write additional notes and thoughts, and highlighters to identify themes.

Figure 7.4: An example of the journals used for my reflection after a session, and early coding using coloured highlighters



Throughout the transcription and data analysis process, I never sought any help from my supervisory team which, on reflection, I realise was not correct. I was not aware that this support was permitted for PhD students. Through discussion with my supervisors, I was informed that they could actually code a sub-set of the data, or act as a second coder to allow for the opportunity to compare analysis and test the appropriateness of the coding framework. This would also have helped to improve the rigour of the coding process; although this impacts on the data presented in here, this greater understanding has allowed for personal development and learning which I can use in the future.

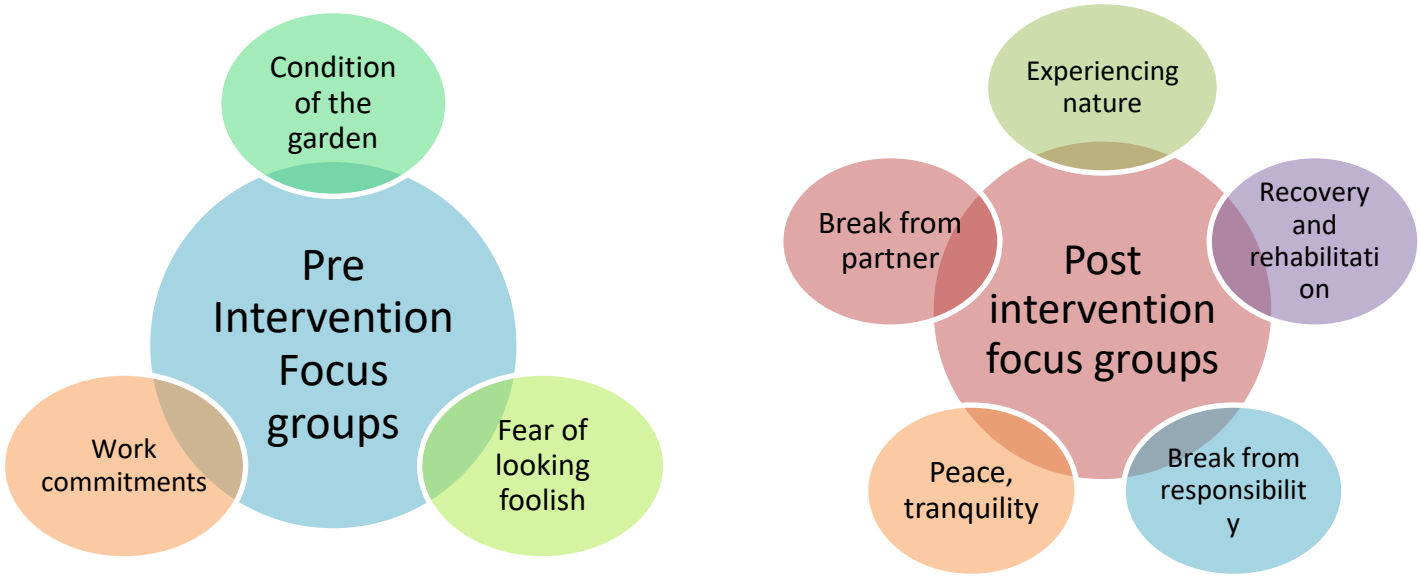
7.3.5 Ethical Considerations

The ethical considerations that were required for Study Three have already been discussed in chapter three. These included ensuring that participants felt comfortable during focus groups and understood that they could leave at any point. Secondly, I needed to think about my own welfare as a researcher and have a system in place to ensure my own safety. Other ethical factors such as ensuring that no one felt excluded or small sample sizes potentially impacting on participants being recognised have been discussed. An important consideration was the need to be mindful of the relationship that I had built up with the participants over the six month intervention. There was occasionally a throw away remark from a participant about wanting the PhD to be successful for me because of the work that had gone into working with the communities and on the site. I had to remind participants that a successful PhD did not equate to a successful community gardening project. That if the gardening intervention did not work very well in certain areas, or at all, then honest feedback was imperative. In addition, reporting those honest results in the PhD findings would help to build a useful and important evidence base. Ethical approval was received for Study Three from the School of Medicine, Pharmacy and Health Research Ethics Sub-Committee at Durham University on 20th July 2015 (reference ESC2/2015/01) (Appendix V).

7.4 Findings

As mentioned previously, focus groups were carried out prior to the intervention, and then again at follow-up. Later in the chapter, I describe the themes that arose across the whole data set. However, what I felt was also important to present in this thesis was the similarities and differences between the initial focus groups and the follow-ups. Figure 7.5 highlights the differences between the two time periods. It appears that some of the concerns felt pre- intervention were not realised and reaffirmed in the post delivery focus groups. However, a number of new themes emerged after the 24 week programme with relation to the positive impact that gardening had had on individuals. Each of these themes will be presented and discussed in turn throughout this chapter.

Figure 7.5: Differences in thematic analysis between pre and post focus groups of Study Three



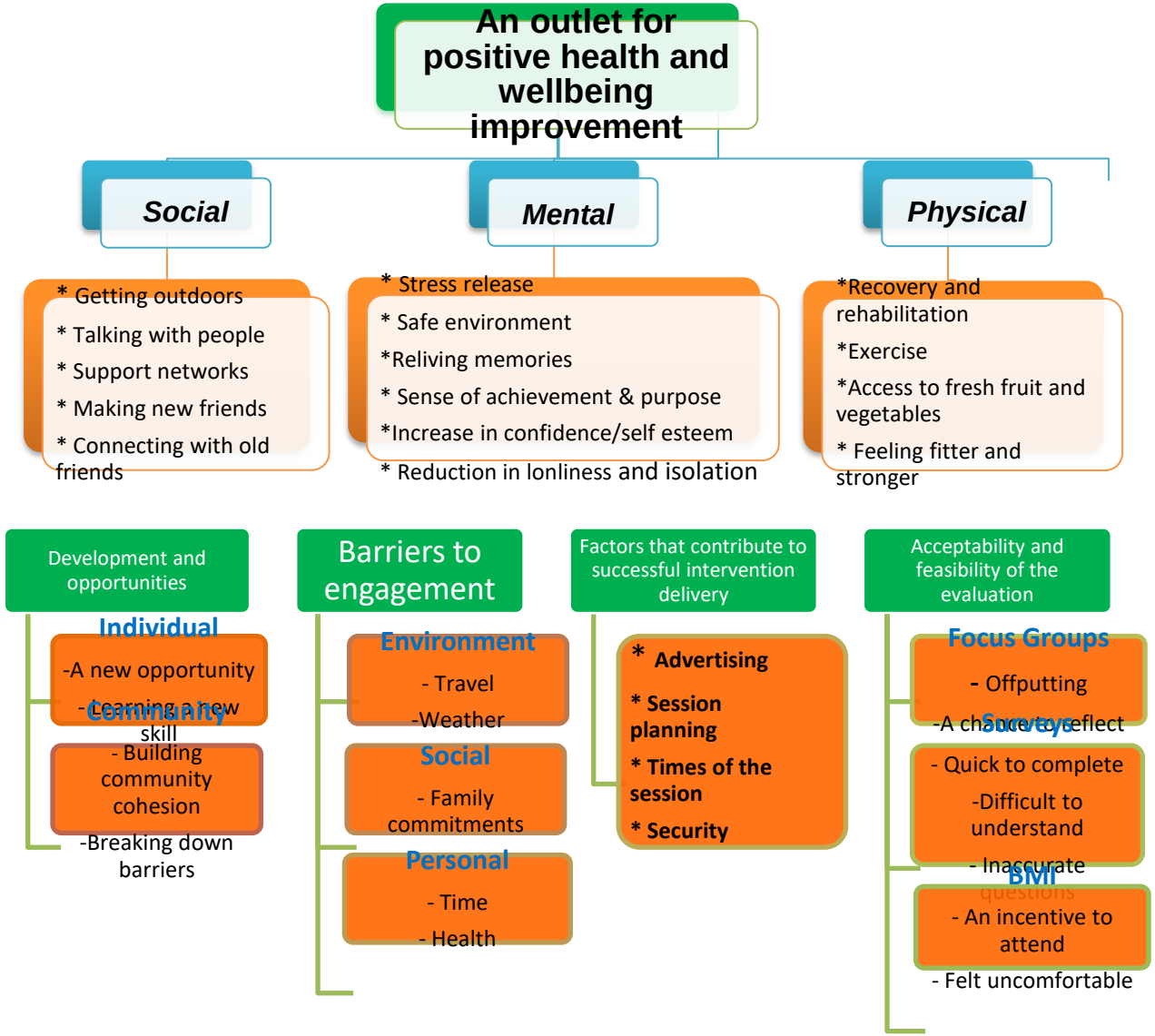
What was apparent from the data was that the pre-intervention focus groups had a higher number of worries and concerns. These included being worried about looking foolish as a novice gardener in front of other people. Participants were concerned that taking on a garden in a poor condition would be extremely hard, and therefore off-putting. Discussions led to talk about work commitments taking priority and leading to feelings of ultimately letting other people at the community garden down. This gave an insight into community members hesitations towards getting involved in a community gardening project.

Interestingly, these worries and concerns disappeared over the course of '*Nourishing Neighbourhoods'.* New thoughts, experiences and beliefs emerged from the data in the post-intervention focus groups that were aligned with positive feelings of health. These included experiencing nature in a peaceful environment and being able to use the community garden as a mechanism to go through rehabilitation and recovery from physical and mental ailments. The biggest surprise was that participants had started off feeling that taking part would be too much responsibility, and finished the 24 week programme with feelings of being able to escape from their everyday responsibilities by attending, and this provided an important break for them, mentally and physically.

The qualitative findings presented below are taken from a mixture of focus group data and my own observations that were recorded in a journal after every session. A number of themes and sub themes emerged from the data collected and are represented visually in Figure 7.6. There were five main themes: Development and opportunities; An outlet for positive health and

wellbeing improvement; Barriers to engaging with a community gardening project; Factors that contribute to successful intervention delivery; and Acceptability and feasibility of the '*Nourishing Neighbourhoods'* evaluation. This section will report and discuss the themes and associated sub-themes in more detail that were common across all sites, with findings demonstrated using direct quotations from the transcripts and extracts from my diary entries. The quotes have been anonymised to protect the participants' anonymity and attributed using codes that relate to participant number [e.g. P4].

Figure 7.6: A visual representation of themes derived from the data; codes, sub themes and main themes.



7.4.1 Theme 1: Development and Opportunities

There was a sense of individuals being able to develop through the community gardening programme on both an individual level and also at a community level. At an **individual level,** participants were given new opportunities and a chance to develop skills. On a **community level**, participants were able to build cohesion and bond with each other over shared experiences. Throughout this section, the individual level is described before moving onto community level.

Development and opportunities at the individual level

Participants felt that by getting involved with the '*Nourishing Neighbourhoods'* project, they had been given an opportunity, and also felt that it could be an opportunity for people within their localities, especially for those wanting '*to get out, trying to get more independent'(P23).* One participant believed that the project was particularly suited to those who were seeking employment:

> *"People out of work could be encouraged to come, give them something to do, give them experience." (P1)*

This was supported by a comment made by one participant who was unemployed, and had been signposted to '*Nourishing Neighbourhoods'* through the GNE work and employment programme:

> *"I come through the work programme, to give a couple of hours a week. It was meant to be for 8 weeks, but I just wanted to stay on." (P2)*

The project also allowed individuals to try out and relish new experiences. Some participants had never experienced cooking outside before and were able to pick this up as a new skill. This finding is illustrated by Figure 7.7 which shows participants starting up a fire and cooking outdoors in the community garden for the group:

> *P5: Oh, the fire, food on an open fire, that's, I think, my favourite thing. Because every time I make soup at home it never tastes the same as it did out there. It does not matter what I do to it, it doesn't taste the same as on a fire. It has to be outside with smoke in it. I know it's only through gardening but it's such a, I just cannot get it tasting the same. And I've tried and tried.*
>
> *P8: Tried the Cup-a-Soups? [Laughter].*
>
> *P5: I've tried everything. It just hasn't got that same flavour. It was lovely eating outside like that.*

Figure 7.7: Starting up the fire and working together as a group to cook outdoors

It appeared that attending the community gardening project had also opened the door to other local activities and opportunities for participants. Talking with other participants during the sessions allowed opportunities to learn about other sessions and classes:

> *"Because of this I also go to an art class on a Wednesday night."*
>
> *(P31)*

One of the selling points was the chance to develop skills during the '*Nourishing Neighbourhoods'* sessions. This theme aligns with ART, a theory which suggests that the ability to concentrate can be restored by exposure to a natural environment (Kaplan and Kaplan, 1989), which is achieved during the *'Nourishing Neighbourhoods'* intervention. Sometimes this was through planned activities and other times this was through learning new skills from one another, i.e. peer education. Occasionally this was through learning about gardening itself, as the level of gardening experience differed amongst participants, "*See some of the guys have never done gardening, I've had an allotment for 30 years" (P3).* Even those who had gardened before discussed learning new things:

> *"I've learnt more about plants and gardening, because I've always been interested in gardening, but I've learnt new things, like I didn't realise about the potato tops, for instance; I never knew that. So, I've learnt – and, about recognising blight and other things." (P11)*

On other occasions, participants with further skill–sets such as pallet creativity and wreath-making would share that knowledge with their fellow gardeners. This is demonstrated in Figure 7.8 and Figure 7.9, which shows the process

of using pallets to build planters (Figure 7.8) and a selection of wreaths that were made in the run up to Christmas (Figure 7.9). These sessions were add-ins into the '*Nourishing Neighbourhoods'* programme, and were requested by participants, thus showing the flexibility of the intervention, and evidencing the action research element to the study. One participant described this as *'Not recycling, but upcycling- taking something and adding to it' (P20).* Not only did this provide a positive experience for those learning a new skill, it also made the participants sharing the skill feel good about themselves:

> *P10: You enjoyed showing us how to make those pallet things, didn't you?*
>
> *P3: Yeah, I did, aye.*
>
> *P8: Oh, they were very, very nice.*
>
> *P5: Yeah, really good. Quite a skill.*
>
> *P3: Yeah. I don't mind showing people how to do things if they want to learn any more things, like, you know what I mean? It's a hobby to me, you know what I mean?*

This example demonstrates how community gardening, and in particular the sharing and learning of new skills can improve the self-efficacy of the participants. Those who are learning the new skill experience '*Performance Accomplishment'* and do so through *'Vicarious Learning'* i.e. learning from others. The participant teaching the skill receives positive feedback or '*Social Persuasion'* which can lead to positive '*Emotional Arousal*'.

Figure 7.8: An example of pallets being built to grow some flowers and herbs by participants

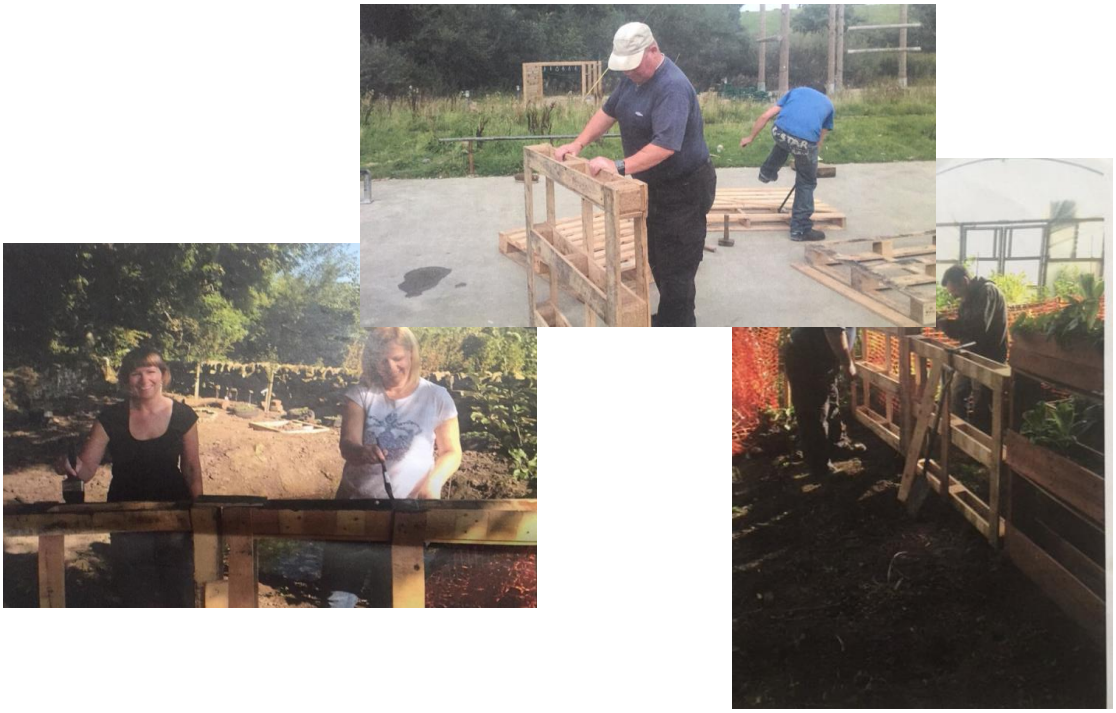


Figure 7.9: One of the groups working on some Christmas wreaths, using materials from their garden

A better understanding of nutrition and eating well was an additional reported benefit to taking part in *'Nourishing Neighbourhoods'*. This new knowledge was seen as something they could take away and use in the future:

> *P21: I think you learn about healthy eating so it covers quite a wide range…*
>
> *P22: Yes. It brings a healthy eating aspect into it as well. It's like the saying, "Give a man a fish he will feed his family for a day. Teach him how to fish; he can feed them for life."*

In addition to learning about the nutritional value of the produce that was grown and harvested throughout the programme, there was also an appreciation of the skills gained in relation to using tools in a garden. This skill development is shown in Figure 7.10, which depicts a participant learning how to use a strimmer:

> *"It's the learning how to grow stuff properly and how to use the tools properly because I have got my own allotment but I am still a bit unsure as to what I am doing." (P4)*

Figure 7.10: Learning new skills; using a strimmer in the garden

Development and opportunities at the community level

Participants talked about the impact that '*Nourishing Neighbourhoods'* had had on building a sense of community cohesion, and that there was a *'feeling like you are giving back to the community' (P14).* Although there were plenty of benefits experienced on a personal level, there was a perceived fulfilment from giving:

> *"Sometimes it's not about yourself, it's going there and knowing it could be helping someone else." (P18)*
>
> *"…..for being outside, for being around other people. You're doing something on a voluntary basis and feeling as if you're doing something good, you're putting your time into something." (P16)*

Giving to others in the community was a strong theme, and it was evident that this was not only related to giving with the gardening group, but also outside of it. The amount of produce harvested varied over the six months on each site, but there would often be an abundance and participants spoke about giving the excess away: '*What I don't use, I give away. I don't sell it like' (P3).* Figure 7.11 shows the volume of produce harvested during an average '*Nourishing Neighbourhoods'* session. Participants had a clear idea of what they wanted to do with this excess produce:

> *"I think if the job was done right and we were here two days a week, erm, as we've got going and we have been educated on when to grow, how often, what time of year to grow it, I think, not enough to be self-sufficient, but have enough to give to food banks and people what have less. And maybe get a second harvest in a year. Because you can come away with 50 onions, 100 onions, stuff like that. Carrots, lettuces. Yeah, I think it can benefit local areas." (P1)*

Figure 7.11: An abundance of produce harvested after one of the sessions

In addition to a sense of giving to the community, participants discussed feeling like they had a role to play in the community they had built within each site:

> *P5: It's a part of bringing everybody together, because [name] loved to light the fire, didn't he? That was his…*
>
> *P10: He wouldn't eat the food but he lit the fire.*
>
> *P5: Oh yeah, and cooking the bacon, he loved that bit.*
>
> *P10: Yeah. He wouldn't eat it but he was in charge of that cooking area, wasn't he?*
>
> *P5: Yeah, it was his.*
>
> *P8: And enjoyed that. That was it. And the kids loved that as well, didn't they?*
>
> *P5: Yeah. I think that is the thing that brought everybody together as a group.*

The '*feeling of belonging'* is a central to the theory of social connectedness, and in this example, the community gardening has brought the group together, as participants felt they each had a role to play in helping the group to gel, and that just like a jigsaw, they are a piece which belongs in the whole picture.

With participants feeling like they had a role to play within their gardening group, the feelings of being overwhelmed by working on a garden were minimised:

> *"I just love doing gardening with other people, and I have tried to have an allotment before but, because I'm on my own, it seemed too hard work; it was just too hard work. But, down here, it's just lovely because I don't have to do it all; there are other people digging and other people doing, and it's just so different." (P27)*

There were suggestions throughout the focus groups that the programme had provided an opportunity to help break down barriers between individuals without shared experiences or characteristics. One participant described the group in their site as having "*a broad spectrum of ages – and views!" (P19).* The variations between different age groups, social groups and those who were able bodied/disabled allowed discussion to help individuals see things in a different light. But more importantly, it brought people together:

> *"Best part you're mixing with somebody 70 odd, I'm 60 odd, [name] is 24, you know what I mean." (P32)*
>
> *"Most people have never met a disabled person before but these accept me for what I am." (P15).*

The community cohesion then provided opportunities for individuals to bond with other participants within the group. Common interests or similar life experiences could be shared within the sessions. One example of this was two of the participants talking about their children leaving home for the first time to go off to university:

"I think we both had sons going to uni as well, which is quite nice because we've got a bit of empathy for each other. Because it's, they were both going off for the first time. First child going off for the first time." (P10)

My auto-ethnographic account reflects the feelings of cohesion and bonding amongst participants as a result of participation at the community gardening. This is described in an excerpt from one of the sessions outlined in Box 7.1:

Box 7.1: Diary entry, Ferryhill, session three. Reflections on bonding and a common purpose

"First thought today was how are we going to get rid of all these overgrown hedges. A fire was suggested, and then the possibility of cooking on the fire. This went down very well! With all kinds of suggestions flying about. People started offering to bring different things. I can already sense a kind of bond developing with the group after only 3 sessions. What is it that forms this bond? All having the same goal? Connecting with each with a common purpose? Or is it just the thought of sharing a good meal? I guess time will tell."

The community cohesion that participants spoke about, and from what I observed, helped to build a level of trust amongst the groups. This finding can explain how social capital is a theory which underpins a community gardening intervention, as it creates an environment where 'trust, norms and networks' are established to help improve society (Putnam *et al.,* 1994).

As part of breaking down barriers, there was a sense of inclusivity. Participants did not appear to feel excluded in any way, and reported feeling that they had a role to play no matter what their personal characteristics were:

"The biggest thing, really, is just seeing people involved. I don't think it has mattered, kind of, what personality you have got; if you're quiet or loud, what does it matter when you're gardening? So, I think it is just nice to see that kind of inclusion." (P19)

Figure 7.12 is an example of participants all playing a different role in the development of their community garden.

Figure 7.12: Participants carrying out different jobs on a site during a session

Following on from the feeling of inclusiveness was a sense of really getting to know other members of the community, as there was interaction with people the participants felt that they probably would not normally interact with:

> *P14: we don't interact very much with the rest of [place] whereas, down here, you are immediately – we've had lots of conversations, and we are –*
>
> *P16: You become visible, don't you?*
>
> *P14: Yes, and you're more part of the community, rather than just there, so I think that is good.*
>
> *P19: I think that is probably one of the good things about, actually, the fence not being up because when people have been coming along, they have been stopping and having a chat.*

This interaction was felt strongly within the Ferryhill site, as a number of participants also belonged to a mental health support group. Mental health can often be stigmatising, with those suffering feeling isolated from their community. '*Nourishing Neighbourhoods'* provided an opportunity for the community to see and interact with users of a mental health support group, and this was felt to have a positive impact:

> *"It also strengthens that community feel, and the community are watching us achieve things, where they may have a different perception of people with mental ill-health, or people with difficulties in life, or setbacks in life. It just gives a different perception of what people can achieve, rather than looking at people in a different way, or a stigmatised, stereotypical way." (P15)*

This increase with community interaction actually led to a feeling of security on the site:

> *P14: I have found on more than one occasion when I have been up there that the people who have the allotments around about have been speaking to me. They have been asking me what we are doing and I have been telling them. They say, "Excellent. Well done" because it tidies up the allotment and it helps them because the more people that are on there, the better it is for the site when there are more people using those allotments.*
>
> *P26: That's what you usually find with community projects, especially in the little villages around here, a lot of the people on the allotments will chip in and help or guide and obviously do the best they can. […] We are a team and obviously we want to be part of the community as well. So, participating with other communities and members of allotments as well to engage with the community.*

It was also felt that because children and young people were welcome to get involved with the programme, there was a sense of 'intergenerational inclusion':

> *"It wasn't too much of a bother because you let the children come and you involved the children, so actually they could get involved with it nearly more than me. They loved it, coming down, so you enabled that, not to be a problem too much for me anyway." (P8)*

This element of intergenerational acceptance was felt to be crucial to the sustainability of a programme such as *'Nourishing Neighbourhoods'*:

> *"With a long-term project you have to make sure you sort of involve the kids." (P5)*

One possible reason why this may be crucial to making the programme sustainable is the fact that a 'family friendly programme' prevents the issue of childcare being a barrier to engaging. This finding is also underpinned by the social connectedness theory, as the community gardening provides an intervention where the whole family can feel like they belong. Figure 7.13 shows a family orientated session, with cooking, but also toasting marshmallows over the fire pit:

> *"It's nice to have somewhere to bring the children to where they are as comfortable as you are. It's been really nice through the summer holidays, not worrying about who is gonna look after them." (P8)*

Figure 7.13: Working on the fire together and toasting some marshmallows during the school holiday

7.4.2 Theme 2: An Outlet for Positive Health and Wellbeing Improvement

Health and wellbeing improvements within a social context

Reported improvements in general wellbeing as a result of attending '*Nourishing Neighbourhoods'* was a recurring theme throughout the focus groups. Participants talked about how they felt good in a social context after attending a session:

> *"….definitely it cheers you up coming here and it lifts your spirit and you always go away feeling good." (P6)*

> *P24: It's wellbeing when you've finished. […] Feel good factor afterwards.*

“My reason [for attending] is I feel better when I'm going out than what I did when I was coming in. You can't beat that.” (P31)

The gardening programme enabled participants to get out and do something socially, for enjoyment and for some fun:

“To get somewhere out of your flat, have a bit of craic.” (P16)

It was expressed that one of the key benefits and motivators to go to the sessions every week was to help reduce levels of loneliness:

“I think for some people as well you might get a lot of people who are in retirement and probably on their own. I think that's where your social aspect comes in as well because that might be the only contact they have with other people and they can make friends. So there's that aspect of it as well I think.” (P27)

“I like coming here because it gets quite lonely at home, sometimes, and I enjoy coming out and being with people; being surrounded by people.” (P7)

There was the evidence that the gardening programme was having a positive impact on the mental health of participants by reducing their perceived levels of loneliness and social isolation:

“I think, by trying to achieve something, as well, and people taking part in something, it encourages the other people – the members of the group – who also suffer from isolation and exclusion, and who are maybe not achieving things they would like to achieve, or they think they could aspire to achieve if they didn’t feel poorly or were in a bad place. It inspires them to come to a better place where we, hopefully, are trying to achieve something and have an end result where we’re all working together, and I think that’s really important, that we all work together to move forwards towards – on a journey towards a better life, and a better wellbeing”. (P16)

It appeared that feelings of loneliness were not specific to men or women, older or younger people, but that all groups could potentially be affected:

> *"Cos actually being a mum when your kids are at school, it can actually be a really lonely life. And where we live, if we didn't go out for a coffee, we would be stuck in all week. I can go days without seeing anyone. It's lonely when all you've got to do is housework and get the tea ready for the kids." (P5)*

The community gardening programme was also seen as a better alternative to other, more sedentary activities, particularly for older adults:

> *"Well you're not sitting at home moping or watching tv at least." (P25)*

> *"When you are retired you just tend to go a bit stale, sitting in the house doing nowt." (P7)*

One of the issues discussed most frequently was the opportunity that *'Nourishing Neighbourhoods'* gave for participants to simply talk in what was perceived as a private space:

> *"It's difficult to say but it's pure simple enjoyment the pleasure of conversation." (P17)*

> *"And it's such a quiet, sheltered spot down there, you do feel quite private. It does feel like it's quite confidential when you're talking to people down there almost." (P10)*

Sometimes the conversation was just a by- product of an activity. A few participants mentioned that they would talk as they worked. An example of this is shown in Figure 7.14, where some participants are weeding, but using the opportunity to talk also:

"But that's when you do the most chatting, wasn't it, when we were actually in lines doing the weeding? We'd just chat away." (P25)

Figure 7.14: Enjoying some weeding and talking!

Other participants discussed how '*Nourishing Neighbourhoods'* provided an outlet to discuss health issues they might have been facing, and that the group presented a support network, aligning social capital and the theory that community gardening can have a positive impact on health due to the support networks that develop. One particular support network that was mentioned on a couple of occasions was for those suffering from bereavement:

"*I live on me own, wife died and if I didn't have this I would have nothing." (P23)*

"I suffered bereavement and everyone from the group were there for me." (P33)

One particular participant had experienced a bereavement, but their motive to be there was different:

“Sometimes it’s not about yourself, it’s going there and knowing it could be helping someone else.” (P22)

One of the facilitators, or motivational factors for participants to attend ‘*Nourishing Neighbourhoods’* was the potential to meet people and make new friends. Sometimes this was because someone had just moved into a new area, or because they had recently retired. In some cases, it followed bereavement. This opportunity to make new friends at the garden then provided further opportunities to attend other community events or social outings, strengthening social networks and increasing the chances of meeting more people in different social circles:

“We sometimes go to the pub as well, some might go for a walk, if they don’t they go to the pub.” (P27)

“Well I moved to here two and a half year ago so I kept going back to [name of town], where I came from, to go to different things. Because this started, it was really great for me to come here, just walk over the road. Also, you meet people. I don't go out socially with them but I meet them here and it's very friendly. You get to know everybody.. I want to do more in this community actually but it's finding something to do so I would be very pleased if they did more things here, even if I have to pay for them.” (P33)

“I think the fact that it's all part of the programme, isn't it, you're interacting with people, finding out how they are, doing things, otherwise a lot of people will just stay indoors. It gives you a reason for going out in the afternoon because sometimes you're more comfortable not to bother.” (P14)

Being able to socialise with new friends made in the programme away from the sessions, has helped to further develop social networks:

“We always go for a coffee afterwards, don't we? We sit for about an hour. [Name] offered me a lift home tonight which, she didn't know I was walking, I didn't know I was walking until I stepped out

the door so [name] said, "I'll give you a lift home if you want one." (P8)

This suggests that the relationships that have developed within a community gardening environment are robust and extend beyond the garden 'walls'.

In some cases, the gardens also provided an unexpected chance to reconnect with old friends, with Figure 7.15 showing old friends catching up on one of the sites whilst taking a break from the gardening. One participant was not keen on catching up with people by going out on a night and so felt they were missing out on seeing friends. But *'Nourishing Neighbourhoods'* replaced the night-time socialising with something they felt much more comfortable with:

"It gives me something you know, I don't go to pubs and clubs so I don't get to find out what goes on. But I can catch up here." (P7)

Figure 7.15: Reconnecting with old friends

Health improvements within a mental health context

Building on the impact that participants described from simply being 'able to talk' to other people throughout the gardening programme, the discussions also indicated profound impacts on participants' mental health. It appears that one of those impacts was reduced feelings of stress, and the capacity of gardening to offer a mechanism for relieving stress:

> *"And things like talking, just talking about things in your life. So I mean, for me, a big part of my life at the moment is my children and maybe things aren't going brilliantly for me as a parent. And I think it just, it gets you to let off steam or talk to somebody, or see somebody else's point of view, how they might deal with the situation. Or, you know… So for that side, the social side. And you don't even realise that you're doing it, really, until we stop meeting. And then all of a sudden you realise you're not doing that." (P8)*

Although talking was able to provide a form of stress release, the physical act of gardening and the tasks it involves were found to offer another type of stress relief- through physical exertion*:*

> *"And actually, yeah, just like hammering away at something as well, or carrying something heavy, gets all of that built-up emotion out of you. So that by the time you leave you do feel a lot calmer." (P5)*

My auto-ethnography was littered with comments about participants feeling better after a session because of being able to take part in a physical activity. Even something as simple as digging was found to have a positive effect, evidenced in Box 7.2.

Box 7. 2: Diary entry, Barnard Castle, session 11. Gardening as a form of stress relief identified in my session reflections

"A few interesting things spoken about today. P said 'I just love digging, I just come down and dig. It helps me get stress out!"

The gardening offered some time away for participants, with one participant saying that they could just "*go down the garden out of the way".* It offers a kind of escapism, sometimes from life in general, and sometimes from a particular person:

> *"To get away from the missus. Coming here, it does make a big difference. I know the lads like a bit of a joke, but it gets you out the house, gives you something to do and you're learning a lot more. And I like the fresh air. Most of the time I'm in the house."* (P26)

One of the common topics throughout the focus groups was that participants felt 'safe'. They could trust others in their group, and felt that they could rely on gardening colleagues to some extent:

> *P21: I think it's creating a nice place for people to go and spend time so, like a nice environment for people to go to.*
>
> *P22: Yes, a safe, comfortable environment.*

This was especially true for those with enduring mental health problems:

> *"I suffer depression, epilepsy I don't go nowhere during the weeks apart from here. I feel safe here." (P25)*

> *"I had like depression, I've got mental health problems, I tried to commit suicide – going to hospitals and stuff and they told me*

about this place so I came down. I don't trust staff at [name of hospital] but I can trust people here." (P16)

Emerging from the data is the notion that community gardening provides a space for feelings of safety and trust to be established. These feelings indicate that the intervention is acting as a mechanism to increase levels of social capital within that particular group and community, which Wilkinson suggested were evidenced by the level of trust, reciprocity and solidarity in society (Wilkinson, 1996).

Some participants felt that they had the chance to re-live and recall memories of previous positive gardening experiences. This provided comfort and was interesting to other group members, and helped to trigger some memories of their own:

P19: I thought it was nice that people remembered what they used to do when they were kids, because you hear everybody saying 'my dad used to do this'. This is what you do, don't you? I think that's something I never thought about, that you actually revisit other good times.

P26: Old memories.

P19: Yes, other good times. And you remember things as well. My granddad was a keen gardener and, as people say things, you remember things that he did; taking the tops of potatoes, the flowers off potatoes. It brought back my granddad doing that.

Another reported mental health benefit of participation in '*Nourishing Neighbourhoods'* was the opportunity to 'use their brains':

P22: I think it's because you're concentrating on something that you've got to put 100% into because if you didn't then you wouldn't be able to do it. So your mind tends to concentrate on that one thing and it doesn't go wandering off in all directions where you would normally do.

P15: Yes, I have to concentrate so it's good for my mental links in my brain, isn't it? It is good from that point of view.

One finding that came up a number of times across the focus groups was the suggestion that attending the community gardening programme allowed for some 'me time' for participants, to escape the struggles of everyday life. The sessions were seen as offering two hours 'to escape':

"My husband's got dementia and it's wonderful to get out." (P32)

I picked up this sense of escapism, calm and restoration on a site one day, when a participant explained how even listening to the noises that can be heard in a quiet gardening space could be relaxing. The auto-ethnography extract explains the observation in Box 7.3.

Box 7.3: Diary entry, Barnard Castle, session 11. Reflecting on the therapeutic nature of the community garden

"As part of the project, we have been building a pond on site. To do this, we have been switching on the hose and filling the pond. One of the p's [participants] commented today about how 'therapeutic and calming' it was to listen to the water trickle".

The sounds within the community gardening environment which were discussed by participants as being relaxing and enjoyable, as well as observed by myself during reflective writing, connect the theory of biophilia into the underpinnings of '*Nourishing Neighbourhoods'* as an intervention to improve health and wellbeing. The desire to engage with the outdoor intervention is

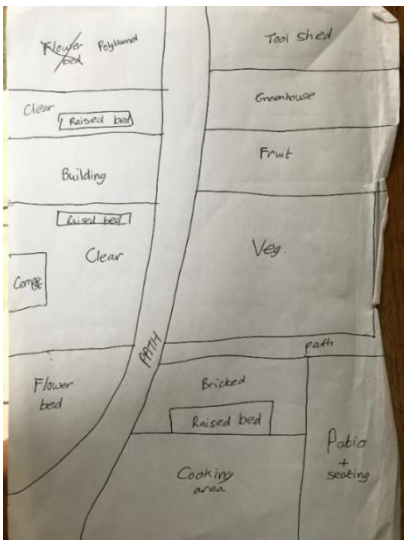
something that participants potentially have a genetic 'urge to affiliate' (Wilson, 1984) and this is a basic human need (Kahn, 1997).

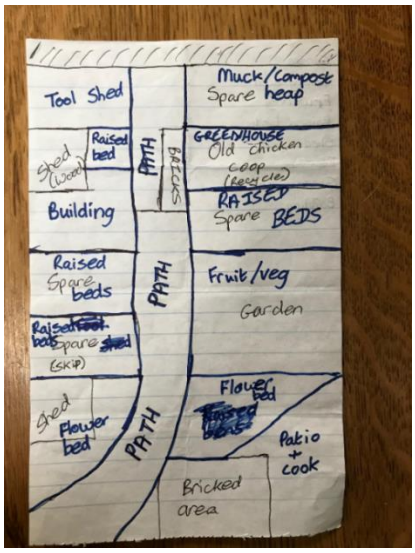
Being a part of the '*Nourishing Neighbourhood'* programme helped to improve participants' mental health as it provided them with a sense of purpose:

> *"There is a reason why we're here, and we know what we're doing; we have a plan each week, we do it and get satisfaction in achieving that." P15)*
>
> *"It gives me something to look forward to. I know I'm not doing anything at the moment, but, during the week, I miss not being in here and doing something. Just even sitting about is helping me, but it's good; you've got something to look forward to. All it takes is only two hours a week, but look at the achievement we have done, you know, so hats off to everybody, and well done, and let's keep up the good work." (P4)*

The sense of purpose felt by participants was shown when effort went into designing the sites, and coming up with suggestions for the layout, as seen in Figure 7.16. This also supports the participatory action research element of *'Nourishing Neighbourhoods'.*

Figure 7.16: Ideas for developing the site at Ferryhill





This feeling of purpose within the participant's lives resulted in them wanting to commit to the site. Figure 7.17 showcases the difference made at the Ferryhill site over a matter of months:

> *"It's amazing what everyone has achieved and how dedicated and committed they are to something, and actually focussed on doing something, and what an amazing difference there is, in the space of leaving it, to coming back to it. It's something that is going to inspire me to come back again and try to keep going, rather than dropping out." (P2)*

Figure 7.17 Ferryhill site improvements over the course of 'Nourishing Neighourhoods'

This finding was supported by an entry in my journal (Box 7.4) which captures how a sense of achievement can lead to more commitment from community

members, and perhaps a feeling of ownership which leads onto feelings of responsibility.

Box 7.4: Diary entry, Horden, session three: The impact achievement can have on motivation

A comment from one of the ladies on site [participant 32]: "I can't believe what moving a few bricks and stuff can do to transform somewhere. This looks totally different to what it did two hours ago. Think we will come back on Saturday [outside of the scheduled intervention sessions] and do a bit more clearance".

Participation in '*Nourishing Neighbourhoods'* led not only to a sense of purpose and a feeling of responsibility and commitment, but also to a sense of achievement following on from completing a task, learning a new skill, or being able to take home a bag of fresh vegetables after a session, saying "I grew these!" (P6). Figure 7.18 shows a participant learning to grow vegetables straight from seed.

> *"Satisfaction. Job well done. You've planted them, you've grown them and you're eating them, so, you know, things like that." (P25)*

> *"As well as the fact that you can be eating something and you can say, "Well, I grew that." (P21)*

Figure 7.18: Learning to grow their own produce from scratch

The sense of accomplishment was not exclusive to growing fruit and vegetables. Some of the sites were in a poor state when the intervention began and the changes that were occurring week by week did not go unnoticed:

> *"The biggest positive, for me, is seeing the results we have created. Like I say, I've got photographs on here. If you look at the photographs I've got on here, from when we first started, to what we have done now, it's amazing. You look at when we first started." (P15)*

> *"Look, look at all that [indicating to photograph on participant's phone]. That's when we first started up. Look at what we have done now. I take my hat off to everybody, and I just think well done." (P31)*

> *"I would say it's quite important to sit down, have a cup of tea and watch everything go on and when you see compared to what it is like at the beginning to what it is like at the end, you will think what you have done is a great achievement and see how you have changed the garden around." (P11)*

An increase in confidence was a positive impact that participants felt had been achieved through taking part in '*Nourishing Neighbourhoods*':

> *"It's given me more confidence." (P24)*

> *"For me it would be to think of the health benefits, i.e. being more motivated and being in the fresh air. It's also seeing all the*

produce you have grown and thinking, "Wow. If I can do that I can do anything." (P2)

There were also reports of enhanced wellbeing in the form of increased self-esteem:

"It makes you feel good about yourself, doesn't it, when you're helping other people?" (P27)

These feelings of pride were something I noted in the first session at Ferryhill, and reflected on in a journal entry in Box 7.5:

Box 7.5: Diary entry, Ferryhill, session one. Feelings of pride amongst the participants and myself

"Literally though, two hours work and we can't believe the difference. All we've done is start to move the rubbish, and try to recycle items that we can re-use. Also, [participant 21] has unearthed the pathway underneath overgrown weeds and moss- he seems very proud of that."

Health and wellbeing improvements within a physical context

'*Nourishing Neighbourhoods'* provided a space for people to physically recover, rehabilitate, exercise and have access to fresh fruit and vegetables. A number of participants used the gardening programme as part of their recovery from an addiction:

"I don't wanna go back on the booze so it's company." (P1)

Box 7.6 highlights the observation I made during a session with a participant who was a recovering addict. I felt that the gardening programme provided them with an outlet for those addictive thoughts and behaviours.

Box 7.6: Diary entry, Leeholme, session 12. Mechanism for recovery from addiction

“One of the guys [participant 16], went straight into work mode. He put earphones in, and seemed to get lost in his own little world. Only coming up for breath when someone shouted ‘tea or coffee?!’ And even then he was adamant that he finished off the bit he was working on. He said, ‘once I’ve started something, I can’t stop. I know it’s a bit OCD, but it’s something I can’t help”.

The potential of the sessions to be of use as part of rehabilitation was also valued by participants engaged in recovery from a physical injury, especially once formal health services are no longer involved:

> *“He [P20’s husband and fellow group participant] recently had a heart attack and he's diabetic and after the heart attack he came home and he was in rehabilitation, it was really intensive. It was 13 weeks at the [place]. He was getting seen every week and his blood pressure taken and things and then it just stops, there's nothing out there. There's nothing at all out there after this 12 week rehabilitation, it stops. So when we saw this advert I said to him, "Please will you come with me because at least it's something once a week," because I was quite concerned obviously with his health and his diabetes. We wanted to keep him as fit as we could.” (P20)*

This identified a current gap in health care provision for some participants, which ‘*Nourishing Neighbourhoods’* had been able to fill:

> *“I mean even now we still look, or I look, to see if there's anything out there and it's really difficult to find. You can see back pain classes, you can see all sorts of different things but for healthy exercise for diabetes, all there seems to be is this, or an appointment at your doctor's surgery and nothing else.” (P27)*
>
> *P32: I think there is a huge market for programmes like this.*
>
> *P33: These sessions are plugging that gap for us, aren't they, so please let them continue.*

For some, it was part of their recovery journey in relation to mental rather than physical illness:

> *"My mental illness I've had since I was 16 it's not getting better but it's on its road to recovery." (P16)*

> *"I'm lonely but coming here picks me up so much I haven't turned to the bottle since I've come here." (P11)*

The emergence of findings that support community gardening as an intervention which provides an opportunity to recover from physical injuries, mental ill-health, and addictions suggest that the theory of recovery capital is something which underpins community gardening as a mechanism for health improvement, specifically recovery. Drawing on the notion that recovery capital is the breadth and depth of internal and external resources that can be drawn upon to initiate and sustain recovery from AOD problems (Granfield & Cloud, 1999; Cloud & Granfield, 2004), a community gardening intervention potentially has the external resources needed to initiate and sustain recovery, as well as provide opportunities to develop internal resources. A suggestion that has already emerged in Chapter seven, with a number of health and wellbeing outcomes observed that indicate increases in participant self-efficacy.

Another example of how an increase in self-efficacy from engaging with the intervention can have an impact on wider life experiences is the experiences of participants making the transition from the criminal justice system back into their community. One participant who was also going through a rehabilitation period after coming out of prison highlighted the complex issues faced by prisoners getting ready to be released:

> *"Where do men who are isolated, lonely, mental illness, got prison records go? There's nowhere else to go." (P1)*

The stigma attached to those who have been in prison makes it a difficult task to settle back into the community. Community gardening interventions such as '*Nourishing Neighbourhoods'* can provide that non-judgemental space, and potentially help improve an individual's mental health, as well as provide opportunities to learn new skills and create social networks. These changes in health and knowledge can lead to an increase in self-efficacy.

A recurring sub-theme was the increase in exercise that was experienced because of participation in '*Nourishing Neighbourhoods'*:

> *" It just fits in with the fact that I've been trying to do more exercise, and do more things, so it kind of fits; it reinforces it, rather than being a completely different thing." (P31)*

This was particularly the case during the colder months when participants felt they perhaps would not normally be as active:

> *"I think it was really good doing the winter months, when we were coming up, because I think, during the winter, you don't tend to do stuff, and you don't expect – you don't push yourself to do anything, but we were up here once a week, sometimes twice, we did, and it keeps you ticking over. It keeps your body moving, and stuff like that." (P19)*

In terms of observing the physical activity that participants carried out, it was clear that this varied from one person to another. There are many jobs to do in the garden, and not every job is physically exhausting. Looking through my journal entries, it was evident that some sessions required high levels of energy and being physically active to get through the jobs on site. Through reflection (Box 7.7) I could see that just like any activity, gardening could be

low intensity or high intensity depending on the commitment of an individual to a task.

Box 7.7: Diary entry, Ferryhill, session 16. A personal reflection on physical activity levels used during a session

"Participants seem genuinely tired from the session. Definitely one of the most physical areas we have had. I am absolutely worn out too!".

In terms of individual levels of physical activity, participants felt this had increased over the course of the programme. There was even the suggestion that for some the sessions had acted as a catalyst for additional physical activity:

> "*Sometimes I don't go home, I walk round the park that is close by, but it has to be a nice day." (P10)*

Participants felt by that attending '*Nourishing Neighbourhoods'*, they enjoyed an extra energy boost:

> *P25: But they must be releasing endorphins as well. It gives you a happy feeling when you're doing it.*
>
> *P22: You always feel better when you come away, don't you, even though you may feel, "I can't be bothered today," but when you finish the session you feel great.*

> *"I've only been coming about six months I think so I've not much to report other than I find it quite invigorating. I always feel better going out than when I came in." (P14)*

An example was given of weight loss that the participant attributed to taking part in the community gardening programme, with an appreciation that healthier eating had also helped:

> "Since coming along to the sessions I've lost one stone and one pound. I have been eating healthier too." (P25)

Several participants described feeling physically fitter and stronger as a result of attendance on the programme:

> *"I know this is quite personal but I've had breast cancer and treatment for breast cancer and I suffered a lot of mental problems, really from my nervous system. I couldn't actually sit down, you wouldn't believe it. I just couldn't sit down, I couldn't sleep, I couldn't do anything because the chemo had upset my system. I'm going through a long process of rehabilitation or whatever you want to call it and I find that this programme has really helped me in that. If I think back to my youth, I was tremendously fit and I wouldn't have had any problems with balance or anything like that but I struggle a bit because of what I've been through. The gardening has helped me to build my strength back up. I do find that my mental state is supported by this exercise that I'm doing." (P33)*

Throughout the focus groups, there were suggestions that the sessions were a help in terms of dealing with physical health problems, and improving mobility and circulation:

> *"Well I've got osteoporosis of the spine and I asked my doctor about coming to this and he said definitely no problem doing it. It does help." (P4)*

Another intermediate health outcome that was experienced by some participants through the programme was the increase in access to fruit and vegetables they experienced. On occasion, participants spoke about a greater awareness of fruit and vegetables in relation to their own diet:

> "*I think, when you're growing veg, as well, it gives you more of a – I know this sound strange – but a connection with vegetables, and it makes you more aware and I think that form, for me, made me more aware of how poor my diet was and how appalling it was,*

because I don't eat any fruit or – well, I eat a little bit of veg but not a lot of fruit, and it made me aware that I, actually, maybe should do something about it, if nothing else". (P27)

There was also an appreciation of the different types of fruit and vegetables that can be grown that perhaps had never been tried before. This did not necessarily have to be down on the gardening plot, but was happening away from the garden too:

"The variety of fruit and veg that I am gonna try now, I'm eating now, that I'm asking people about. I mean there is the vegetable called celeric that came through on my till [when working on a supermarket checkout]. Normally, I wouldn't really show an interest in fruit and veg, I'd just scan it and that would be it. Now I ask people. I'd think about how I could incorporate it into my cooking. It's just made me more curious about what is available." (P10)

Participants reported really enjoying the experience of tasting produce that was fresh and home grown, with one participant explaining *'You can't beat fresh vegetables like' (P6).* There was an enthusiasm when talking about the food, explaining that it led to their consumption of a greater volume because of the increase in enjoying food:

"The quality is much better, the taste is much better when you grow your own. And then you do eat more when it is in season. And you should eat it when it's in season, as it does have a very different taste." (P14)

"It looks perfect in the supermarket, doesn't it? But it tastes better here. And the children, they'll go round picking things straight from the garden, things they wouldn't normally. I could buy a lettuce and they wouldn't eat it, yet they go in the garden and they'll pick and eat it while they're there." (P8)

"Normally I would buy a pre-packed iceberg lettuce. But when you pick from down there from the mixed leaves, every leaf tasted

different. Makes you realise that actually lettuce does have a bit of flavour. Iceberg has no flavour, it's just crunchy!" (P11)

There was also some discussion about the increase in eating raw vegetables:

"I'm eating a lot more raw fruit and veg, as in carrots I'll eat them raw. Cos you get used to just picking stuff up and trying it. Whereas I wouldn't have dreamt of doing that at home." (P19)

Participants commented on how they felt fitter, felt stronger and more flexible at the post-intervention stage. Improvements in cardio-respiratory performance were also noted for some:

"Yes, I feel a lot healthier, and I can do more work, physical work, and I really enjoy it." (P7)

P14: I think, knowing [participant 26] for the time I've known him, he's actually breathing now.

I: Yes, breathing easier?

P26: Yes. Well, earlier in the year I had a lot of chest problems and that has cleared up now, and I can do a lot more physical work now, which is great.

In addition, some participants felt that the programme was ideal as it catered for various levels of physical activity. Even those participants who wanted to engage in gentle exercise were not excluded:

"And these are like my first steps, really, into gardening, and it's been enjoyable because it's been knowledgeable but gentle. I haven't felt out of my depth in any way." (P10)

Although there was evidence that the sessions had provided an outlet for physical activity, there was the suggestion that community gardening did not allow for sustaining physical activity across the year due to issues such as weather, and that fitness peaked during the summer months:

> *P 19: I've noticed stopping for the winter, but then I was doing quite a lot of gardening other than that gardening.*
>
> *I: Right.*
>
> *P19: So I feel a lot less fit than I did throughout last summer.*
>
> *I: Okay, so you feel that since stopping…?*
>
> *P19: I'm still going to the gym and doing things like that but doing that day-to-day gardening, I've really, really noticed it's stopped.*

There was also an appreciation and understanding amongst participants of how physical and mental wellbeing were inextricably interlinked:

> *"I think maintaining my physical health certainly helps my mental wellbeing as well, so they both work together, definitely, because I think the less I do, the less motivated I am to do something." (P16)*

7.4.3 Theme 3: Barriers to Engaging with a Community Gardening Project

There were a number of barriers that were mentioned consistently in both the focus groups prior to the start of '*Nourishing Neighbourhoods'*, and then following the completion of the programme. One of the perhaps most obvious was poor weather conditions, which was also mentioned as a potential barrier during Study One:

> *"Well, I think it has been during the winter because, sometimes, the weather has been – we did, I think, really well to continue all through the winter. You wouldn't think – I thought, every Friday, all*

through the winter, I thought 'no'. But, actually, it has put us off a couple of times." (P20)

Participants felt that poor weather could then lead onto poor conditions on the site for some time, which might have explained why participants missed a session even when the weather had improved a bit:

"Maybe the condition that the garden is in is a barrier because for example over the last few weeks there has been a lot of snow so the pathways have maybe been a little bit slippery so people may have thought, "It's too slippery. I will come down when it's a little bit better." (P17)

However, poor weather conditions did not put some participants off attending sessions, as highlighted by a journal entry following session eight at Barnard Castle (Box 7.8).

Box 7.8: Diary entry, Barnard Castle, session eight. Poor weather not always impacting on morale or attendance

"A little bit of drizzle today, but that didn't stop the group from turning out. I think the amount we achieved last week was a good motivational factor".

On occasion, participants felt that they could not attend a session due to their own personal health, both physical and mental.

"Sometimes I just can't get along if I'm feeling really crap, like. Nowt can get me out of bed on those days. All I want to do is curl up and not have to deal with anyone. But it's not always like that. If I'm only feeling a little bit down, I actually want to get here as I know I'll feel better afterwards". (P5)

"You know, my back is a bugger. If it goes, it goes and I'm stuck. Even with the best will in the world, there's no chance I can get over to the site, never mind do any actual gardening!" (P3)

However, an interesting comment came from a participant who had some physical issues which prevented him from doing any of the usual physical gardening work, but who still came along to the sessions. This in fact had a positive impact on the rest of the group:

P15: Barriers for me, at the moment, are health problems. It's really difficult for me to come up here and just sit about, and watch people do something, when I'd rather be of help.

I: Yes, so that is like a mental barrier, isn't it that you – ?

P15: Yes, it's mental.

P16: But, for [participant 15] to come here shows willing, at least, you know, and it's an inspiration to the rest of us.

One barrier mentioned was the amount of time needed to give to the programme:

P23: I'll tell you what is also a barrier. Time, for people, as well; time for people to be able to come along and help out.

P14: Sometimes I can't get here because I've got about three things on, on a Friday.

This was of particular concern to those involved who were unemployed and looking for work at the time. In addition, this could potentially be a barrier for those who are already in employment, but would be unable to attend a session if it was on a week day during normal working hours:

"If a job came up that clashed with the session, that would stop me coming." (P)

One barrier mentioned only in the initial focus groups related to potential participants feeling inexperienced and not wanted to come due to lack of knowledge:

> *"There's a fear that they are gonna turn up and don't have a clue- that it's a load of experts, saying you can't do this and that... ... ...people don't wanna look foolish."* (P10)

Following on from the delivery of '*Nourishing Neighbourhoods'*, during the post-intervention focus groups, the distance to the sites was brought up as a barrier to some attending more than once a week:

> *"If I was closer, I could just pop in ad-hoc." (P11)*

One participant also explained why another group member had dropped out:

> *"I mean, he was really enjoying it, wanted to come down more days like, but was just too far. I mean, for me, I'm not bothered cos I only live a few minutes away." (P1)*

7.4.4 Theme 4: Factors that Contribute to Successful Intervention Delivery

Participants were largely satisfied with '*Nourishing Neighbourhoods'*, but there were a few suggestions for ways in which it could be improved. As mentioned in the previous section, the issue of distance to site was a problem for some participants. It was mentioned that even living within one mile of the garden still created a barrier for those with access issues. One participant offered a solution:

"I think it would be great if there was a minivan who could pick people up those who had transport issues or mobility issues." (P1)

Although the '*Nourishing Neighbourhoods'* programme was advertised, it was felt that it was not extensive enough:

"*I'd probably plan some sort of advertising campaign to try and get more people to come along. Because I benefitted from it and I think that there's a lot of other people that would benefit from it as well." (P10)*

It was also felt that incentives were needed in the early stages to entice those who were undecided about whether or not to take part, and that this would pay-off in the long-term:

"… maybe if we did some sort of competition or something just for people who are attending the allotment. We could vote at the end of the year for who has done the best and they could maybe win a hamper of produce or a reward, you know?" (P4)

Some advice was given about the advertising which was carried out on noticeboards- something which had arisen from the feedback in Study One when asking how Groundwork North East could best attract participants to a gardening intervention. Notice boards did not receive the same level of support post -delivery:

"There are so many posters up now and noticeboards. People don't even notice posters are up. I walk past the one in Morrisons now and don't even check it". (P5)

An alternative was suggested, and offers an insight into potentially an untapped market for advertising such programmes*:*

> *"Put flyers up in the job centre." (P3)*

There were some ad hoc cooking sessions included in the intervention, and this element had the support to be included following on from the thoughts of a participant during a pre-delivery focus group. Figure 7.19 shows a participant taking part in one of the cooking sessions, using produce that has been grown on one of the sites:

> *"When we do start growing stuff we could do things with that produce like explain where it has come from. Do you know what I mean? So like, for example, when we made the leek and broccoli muffins? So, say, "This is the produce we have harvested? and, "This is where it came from." (P25)*

Figure 7.19: Making broccoli, leek and cheese muffins from home grown produce

Some themes were apparent in both the pre and post-intervention focus groups in Study Three, as well as in the preliminary focus groups in Study One which helped to develop '*Nourishing Neighbourhoods'*. Accessibility to the site was a regular comment, and was still being raised as an issue, especially on the sites that had started from scratch. Access was simply not available to all due to the conditions of some of the sites:

P3: It needs to be accessible.

P1: A couple of raised beds as well for people with disabilities.

P2: Yes. Raised beds for people with disabilities.

P3: Clear pathways. Level pathways. We need it to be level. We need some sharp sand for the poly tunnel to level it up.

"Make it wheelchair friendly. So, like we said before make it diverse and open for everyone." (P15)

Figure 7.20 is an example of one of the sites that was developing better accessibility for participants by building raised beds, and at the same, time, learning new skills in the form of bricklaying.

Figure 7.20: Building a raised bed on site at Ferryhill

Similar suggestions came up that had been put forward in Study One, such as *"Having some form of shelter on the allotment as well" (P17)* as well as it being essential that there was *"Access to water." (P26).* Equipment to help the group with growing productivity was also seen as essential, *"We need some kind of greenhouse knocking up somewhere along the line." (P22)*

Differences between the four sites meant that facilities varied. An example of this was that one community garden had a toilet on site, one had a toilet close by, and two had no toilet. The lack of toilet facilities did not appear to be an issue. For the site which had a toilet close by, this worked out well for some participants:

> *"The toilet is handy as well, especially with children." (P5)*

Even so, on the same site, participants were quite happy not to have to make the two minute walk to the restroom:

> *"My daughter has got used to going al fresco (laughter) As long as you don't mind stinging your bum on nettles!" (P8)*

Better planning was felt to be needed for the actual layout of the site, for things such as crop rotation, and simply being organised:

> *P1: It's a shame the beds aren't laid out a bit better. We have got stuff in that area, we've got our diagrams on the wall. We've got taties, we've got shallots. We've got stuff in various areas*
>
> *P3: I mean one of these days when [name] is cutting the grass, he's gonna get carried away and just mow that fence down like.*
>
> *All [Group laughter]*

Additional discussions went from talking about what was the best time to grow potatoes to not having enough variety and wanting to include more flowers:

> *P11: It would also be nice to keep some tubs for flowers like to brighten the place up*
>
> *P4: I mean it's improved since we've come, but I mean, what it could be, that's a different thing again. Like what you say, flowers, and more beds. Different stuff planted.*

The feeling that the sites needed to have access at all times for group members was supported in the post-delivery focus groups, as it was felt to be an important aspect of looking after the garden and having some responsibility:

> *"We can come down whenever we like, on our own, with friends or as the group. And I think it's important to have access at all times."*(P3)

> *"Need access for enthusiastic local people who can come here a second time during the week, when the weather is really hot, things are getting dry. Just to come a second time and water stuff. Half an hour, an extra twice a week. Some of us can even come at weekends, especially to water."* (P6)

The general feeling across sites was that the two-hour blocks were an appropriate amount of time for a session:

> *"I think, with the two hours, when we have done the sessions, people are quite able to work through to, nearly, that two hours, and I think if it was too much, you'd be seeing it that people would be downing tools a bit earlier and stuff." (P15)*
>
> *"Because it's pretty much to everyone's own pace, anyway, isn't it? You do things to your own comfort base levels, and then you can pick it up again when you recover a little bit, I suppose." (P32)*

However, there was a strong belief amongst participants across all four sites that for the sustainability of the programme, one two-hour session per week was "*not long enough for me, like." (P3).*The main reason behind this was the detrimental impact that not attending to crops more regularly had on their survival:

> *"So once a week isn't enough really, either, especially when you're getting your seedlings coming up and stuff like that, somebody has to be there every day watering them." (P2)*
>
> *"Everything dried out because there was nobody to help and water. You can't just leave them, can you? Like the summer, my allotment was a mess though, wasn't it, so it needed a lot of work. I must have been doing, I was probably doing twenty hours a week in total. And that's what kind of hourage you need on a site that's from scratch." (P8)*

This commitment to wanting to be at the garden more than once a week was especially apparent to those who wanted the session to be longer than two hours:

> *"Yeah, a couple of hours can be a struggle. By the time you do your weeding, mowing the grass and trying to do stuff, there's not a lot you can do in a couple of hours. I mean, we're not getting as much done as we could do." (P23)*

The actual day and time of the scheduled sessions was seen as a potential barrier to the success of '*Nourishing Neighbourhoods'* in the future:

> *P26: Maybe a barrier is the time that it is on. For example at the moment it's only on a Friday afternoon and people might not be able to do a Friday afternoon.*
>
> *I: Yes, so it's the timing of it?*
>
> *P26: Yes, it's the timing. Maybe if there were more days available people might be able to say, "Well, I can't go on that day but I can go then."*
>
> *I: Yes, so looking at more flexibility with what days we do the sessions on?*
>
> *P26: Yes.*

Although a plan was in place to deliver a 24-week programme, this needed to be flexible due to the initial differences between each site, i.e. in condition, size, and resources, such as topsoil on site, pre-existing raised beds/poly tunnels, equipment etc. It also needed to be flexible to work around the capabilities of each group, and until the programme started, this was an unknown to me as the deliverer of '*Nourishing Neighbourhoods'*. Some participants felt that a more structured plan would have been useful:

> *"I think we were unlucky in that we couldn't have a very definite plan from one week to the next, because we were lost with the plot really. Because we couldn't really do anything because other people were changing their mind as to what to do with the plot. I think ideally, we'd have a proper plan and stick to it. Because with plants you know when to plant them and what to do with them, and stuff like that, and you have to stick to the calendar programme." (P 14)*

On the issue of planning, it was suggested that indoor and outdoor plans were needed:

> *"Always have a plan A and a plan B, indoor and outdoor." (P33)*

A participant made a related comment (Box 7.9) half way through the programme that I remembered to make a note on:

Box 7.9: Horden site, Session 18: Reflection on future planning of a community gardening programme

"I think it would be nice to have a full day, have something in the morning and then you have something to talk about in the afternoon whilst perhaps doing a little bit of outdoor cooking with our own fresh veg."

Again, it was not always fruit and vegetables that participants were interested in. There was a number who felt that being able to plant and grow flowers was just as rewarding:

> *P4: Also, it doesn't just have to be about vegetables but also about flowers because a lot of people want to plant flowers as well. […]*
>
> *P11: Yes. I fancy doing a bit of flower arranging.*

A facilitator to engagement with '*Nourishing Neighbourhoods'* was familiarity with the delivery staff:

> *"The girls like to come and see you, they enjoy the sessions you deliver. And they'll ask, 'will Natalie be there?' You were the motivation for me to come. Knowing you already through Groundwork. I don't think I would have just come if I'd seen it advertised." (P8)*
>
> *"The only reason I come is cos Natalie is so lovely" (group laughter) (P1)*

This would suggest that for a similar programme to be successful, the right staff and/or volunteers are crucial. They need to have the relevant people skills to attract and engage with the community. Figure 7.21 shows some photos taken with two of the groups, showing the fun side of delivering community gardening interventions, and utilising the popular photo style of a 'selfie'.

Figure 7.21: Ensuring the deliverer of the intervention is engaging with participants

There was a general consensus for the sites that did not already have secure storage to not get a lock up that needed securing, as this may act as a trigger to vandals. It was felt that this might cause vandals to believe there was something of value if there was a lock on the shed/unit and therefore break in:

> *P14: It has made us think about it. So, we have thought about when we might get a shed, and decided that we won't keep anything valuable in it; there will be a few cheap chairs and that kind of stuff, but nothing that we're going to have a sleepless night over if anyone decides to break in, and we have also decided that we probably won't even lock it, because that ends up creating more damage if somebody wants to get in.*
>
> *P19: Yes, because they think 'there might be something valuable in here', and then they actually put the door through and that kind of stuff.*

7.4.5 Theme 5: Acceptability and Feasibility of the 'Nourishing Neighbourhoods' Evaluation

Data collection- focus groups, surveys and BMI collection

There was some discussion about the process of taking part in the focus groups. On the whole, most participants quite enjoyed talking about the programme, as they felt it 'opened their eyes' to the number of benefits they were experiencing from *'Nourishing Neighbourhoods'* without even realising it. It was, however, suggested, that focus groups may have a negative impact on some individuals:

> *"I think it could put people off. Because if you're coming to gardening, people just want to get on and do their own thing. So actually talking about why they're coming to gardening, it might actually put people off." (P3)*

Similarly to focus groups, there were mixed feelings about the surveys administered as part of the evaluation. Participants felt that they were not time consuming, '*Oh, it didn't take long, it was quick, wasn't it?' (P18),* and that longer surveys would be detrimental:

> *"Especially when you're coming to do a gardening project, you don't want to be filling in forms, so I thought that was just about right. There wasn't anything wrong with it." (P27)*

Participants also felt comfortable with the questions that were included throughout the surveys, which looked at fruit and vegetable consumption, physical activity levels and quality of life:

> *"But they weren't intrusive or anything, they were quite, the questions were fine". (P25)*

However, there were some issues around the clarity of the questions and some participants needed help to complete the surveys:

> *"They were fine but the first time I did them I think I misread them all, because I thought it was in the last week or… so perhaps some of it was in the last week and some of it was in the last 24 hours." (P5)*

> *P2: There was a couple wasn't quite sure what they were putting on the sheet, like.*
>
> *P11: Yeah, I think that needed a bit of support when filling them out.*

There was also concern that the questions might not have been getting accurate or meaningful answers from participants:

> *"I found the fruit and veg one a bit – I mean, one of the questions 'are you going to eat more of this next year?'. No, I'm not, because I eat loads and loads of fruit and vegetables, and if I eat any more, I shall be on the toilet all the time [laughs]. Actually, that is of concern for my particular circumstances, so I put 'no' and then it looks like that's not a good answer, but the answer is no." (P14)*
>
> *P19: I will go on eating at least five a day. I am almost vegetarian, I eat loads and loads of fruit and loads and loads of vegetables, but I'm not going to eat anymore, do you see what I mean?*
>
> *P24: That's just what you do with the data, though, isn't it? So, if the data records that you are someone that eats seven portions a day or something – it's how you analyse it.*

The physical activity questionnaire was also deemed to be 'tricky' to answer for some:

> *"I think the one about exercise is quite tricky to estimate, you know, during the week. I mean, I would have to look at my diary*

and say 'there's ten minutes there, there's twenty minutes there'; it would take me hours to do anything other than a very rough estimate, and rough estimates are not always that accurate. And one of the reasons that I bought a Fitbit bracelet was so that I didn't cheat because, at the end of the day, you think 'I've done loads of exercise' and, actually, what I have done is I have driven about the place, and driving doesn't actually – you know what I mean, I'm really tired but…" (P32)

"You know, you feel as if you've done loads because you've been here and I've picked up them, and I've done that. Then, actually, you find that you've only done three-thousand steps or whatever, so I do think that it's – and people will say 'yes, I do loads of exercise'. 'Well, what do you do?', 'I go to the shops twice a week, and I walk along to the bus-stop'. You know what I mean? I don't know how accurate you're going to get it " (P33)

A common reflection that I would make after sessions that involved data collection was the fact that not all participants could read and write. This was an issue in terms of time, as I needed to sit down with individuals and help them to complete the forms by reading questions out loud for them. It also brought into question the reliability of the data, as the answers were being told to me, and there was the potential for participants to tell me what they felt was the 'right' answer as opposed to their honest answer.

Box 7.10: Horden site, session 8: Reflection on using surveys for data collection

"Today was difficult collecting the survey data. I had to support three of the participants completing the forms, which meant that the session was a bit disjointed, and I felt like I was spread too thinly. This is the time when having two members of staff would be ideal. Even though I was reading the questions to the participants and giving them the options for their response, I got the feeling that they didn't always know what I was asking of them, and had to repeat some of the questions over and over again until I felt there was some understanding. This surely impacts on the reliability of the responses".

One suggestion to improve the surveys used for data collection was to try and improve their visual appeal for the participants:

> *"I think, for me, I didn't have a problem filling them in, but I thought that they were quite boring to look at, and I thought, given that they are linked in with healthy eating, healthy lifestyle, it would be nice if they were a bit more colourful and it would be nice if there was some pictorial stuff on them. So, I'm thinking about people who are not the greatest at reading or – you know, so I think, where we're answering questions about having fruit and veg, a lovely nice picture of some delicious fruit and veg would have been good, and would have been helpful for some people, as well." (P19)*

There was a mixed response when it came to the taking of height and weight to calculate BMI as part of the evaluation. Some participants were not bothered whether it was taken or not and some participants thought it was a good idea as part of an overall health programme:

> *"I thought it was really good. I mean, it's good to get it taken before you start doing the exercise then, in a few weeks' time, you've got to take it again, and if you see positive results then that improves your mental health as well." (P14)*

Some participants were comfortable with knowing that the programme involved getting weighed, but because it was not compulsory it did not affect their attendance:

> *"You didn't make it compulsory so, no. But if you made it compulsory, I don't like that at all*." (P8)

Others suggested that measuring BMI could have quite a severe impact for some individuals:

P15: The thing is, you've got to be careful with that, though, because people, especially with eating disorders, will not, under any circumstances, step on a pair of scales.

P26: When I have gone to the doctors before, and they have told me I'm obese, that really upsets me, that does; it really made me feel worse, and I'd go and eat stuff.

One participant added that the only reason that she continued to attend after finding out about the BMI collection was because of the delivery staff, and that the knowledge of data collection affected her dietary behaviours:

P7: Well it doesn't bother me?

P8: Well you're not fat! If I was being really honest, if I didn't know you [the researcher], I wouldn't come to the group knowing I had to do that [BMI]. It would stop me. It would really put me off. I mean, I went on a diet knowing Natalie was going to weigh us the week after.

7.5 Study Three Outcomes: Interpretation of Findings

To help interpret the findings from Study Three, the data is explored using the studies outcomes as headings.

7.5.1 To identify positive or negative outcomes that are direct or related to taking part in a community gardening programme

The impacts are different for each individual, but the findings from this research suggest that '*Nourishing Neighbourhoods'* provides a chance to bring about positive change across a spectrum of individual, social and economic levels (Tenngart Ivarsson and Grahn, 2012).

Participants felt that the programme gave individuals an opportunity to do something and create an environment where they could learn about taking

responsibility. The garden provided a few tasks that needed to be completed to ensure that efforts to improve and maintain the site were not wasted. Tasks such as staying on top of the watering schedule or sticking to the weeding rota may appear to be small, but created a sense of responsibility for some participants, and in turn, allowed for a sense of achievement to be experienced when responsibilities were met (Kingsley *et al.,* 2009; Van den Berg, 2010; Diamant and Waterhouse, 2010; Hawkins *et al.,* 2013).

An opportunity was also provided for learning new skills in an outdoor space, with an element of intergenerational learning involved. Skills such as gardening techniques, knowledge on when to plant and harvest, cooking skills and tool use were discussed within the focus groups. These new skills have the potential to increase community capacity through shared knowledge between generations (Newman and Hatton-Yeo, 2008). Research into the impact of learning outdoors has been focussed on children and young people. The 'Learning Outside the Classroom Manifesto' produced by the Government in 2006 was set to encourage pupils to experience the world outside of the classroom. In line with the manifesto, the development of Forest Schools in the UK became a popular initiative, based on a Scandinavian idea that considers children's contact with nature to be extremely important. A study by O'Brien and Murray (2007) explored the impact of Forest Schools and outdoor learning on children in education. Improvements were seen with several outcomes, including confidence, social skills, communication, motivation, concentration, physical skills, and knowledge and understanding of the outdoor environment.

Waite (2007) argues that the research that has taken place so far with children and young people suggests that quality outdoor experiences that provide positive outcomes may sustain and support engagement and memory. In addition, physical exercise is seen as a promising intervention to prevent or delay cognitive decline in individuals aged 50 years and older, yet the evidence from reviews is not conclusive (Northey *et al.,* 2017).

A strong argument for the adoption of community gardens to be included within the health service as a mechanism to improve health is the evidence that the gardening programme had a positive impact by reducing levels of loneliness and social isolation. Feelings of loneliness were reported to decrease in this study, whilst levels of social integration increased. This shift in increasing social mobility supports previous findings from Brown *et al.,* (2004) and Pettigrew *et al.,* (2008) where indoor gardening helped to reduce loneliness and increase social integration. Additionally, levels of depression were reported to reduce during the *'Nourishing Neighbourhoods'* intervention.

Previous research in this area is strong, with Milligan (2004) reporting that community gardening was a vehicle for combatting isolation. Whether this is attributable to the community gardening, or other aspects of nature is still to be resolved. Higher levels of loneliness have been associated with access to less green space (Maas *et al.,* 2009). Gonzalez *et al.,* (2009) reported a decrease in feelings of depression from gardening. The work of Wakefield *et al.,* (2007) supports this evidence of reducing isolation, reducing loneliness, reducing depression and increasing social integration, as the findings argued that community gardening increased positive mental health.

Approximately 45 million people worldwide were thought to be living with dementia in 2015, at an estimated cost of 818 billions dollars (The Guardian, 2017). Numbers are rising: in England and Wales it is estimated that 1.2 million people will be living with dementia by 2040 – a 57 % increase from 2016 figures, largely driven by people living longer (Livingston *et al.,* 2017). A recent report by Livingston *et al.,* (2017) has suggested that by tackling inactivity, depression and social isolation, the prevalence of dementia can be reduced by 30%. The findings presented in this thesis offer a strong argument for community gardening interventions such as '*Nourishing Neighbourhoods'* to be used in the fight against rising dementia levels.

Utilising community gardening as a tool to improve mental health was also found, with the experience amongst participants of gardening, helping to reduce stress and anxiety. This evidence which argues for community gardening to be adopted as a conduit for stress release was provided by (Mitrione, 2008) who suggested that it was the interaction with nature which reduced stress levels and anxiety, as well as Gonzalez *et al., (*2011) who suggested that gardening was therapeutic for participants. The therapeutic space provided by community gardens was mooted as the reason behind increased levels of happiness by Wright and Wandsworth, 2014.

The therapeutic impact of a talking and supportive network was also seen as positive outcomes that were experienced through attendance at the community garden. Armstrong (2000) supported this finding, with research arguing the case for gardens increasing social networks and building community capacity. Milligan (2004) also suggested that social networks were developed through garden programmes.

Participants discussed the chance to break down barriers with people and groups of people that they were interacting with for the first time. The ability to break down barriers allowed connections to be created, which was previously evidenced by Whatley *et al.,* (2015). The focus group data highlighted that by taking part in '*Nourishing Neighbourhoods'*, the chance to make new friends was provided, as well as occasionally connecting with old friends. Draper and Freedman, (2010) found that significant relationships were able to occur through gardening. In addition to making friends, there was also discussion around how *'Nourishing Neighbourhoods'* provided a space to relive memories, with participants discussing memories of being down at the allotment with parents and grandparents, which led to a feeling of peace and happiness. This finding is supported by the recent work of Buck (2016), who suggested that community gardening was able to connect people to places, with Perrins Margolis *et al*., (2002) found that gardening was able to provides a reminiscing experience.

Another theme which was explored in chapter seven was the opportunity for participants to get outdoors. This was viewed as a positive by many participants across all sites. Not only was the opportunity to be outside getting fresh air and connecting with nature seen as a benefit from the programme, being outside provided the opportunity to interact with people; a finding that supports the previous research of Barton *et al.,* (2009) who concluded that being outdoors supports social inclusion. The positive health effects of the natural environment are well documented (Wells *et al.,* 2007; Bedimo *et al.,* 2005). This body of research is now being promoted through WHO, and their review of the health impact and effectiveness of urban green space

interventions. The report suggests that increasing or improving urban green space can deliver positive health, social and environmental outcomes for all population groups, particularly among lower socioeconomic status groups (WHO, 2017d). The review also highlights that local experiences and urban practice can utilise cross-sectoral collaborations and community engagement in the planning process, as these are essential to ensure that urban green space interventions deliver on multiple outcomes and provide a variety of functional opportunities that attract different population groups.

“Urban green space interventions seem to be most effective when a physical improvement to the green space is coupled with a social engagement/participation element that promotes the green spaces and reaches out to new target groups” (WHO, 2017d, Page 2). This quote supports the fundamental principle of *‘Nourishing Neighbourhoods’*, in that communities work together to deliver a physical improvement in their environment, whilst engaging in social interaction with their community peers.

WHO is committed to incorporating the green space agenda within a number of political frameworks, including:

- The Parma Declaration. By 2020 “to provide each child with access …to green spaces in which to play and undertake physical activity” (WHO, 2010).
- The New Urban Agenda which underlines the importance of public space. It calls for an increase in safe, inclusive, accessible, green and quality public spaces (WHO, 2016).

- The 2030 Agenda for Sustainable Development sets the target in Sustainable Development Goal 11 (target 11.7) to “provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities” (United Nations, 2015).

The topic of urban green space is also embedded in the priority area “creating resilient communities and supportive environments” of the Health 2020 policy framework (WHO, 2012).

A common theme found in the qualitative data was the sense of providing a safe environment for participants, especially those who were going through recovery and rehabilitation of issues such as drug and alcohol addiction, as well as recovery from illness such as cancer and hip operations. Norfolk (2000) spoke about garden plots being able to “harness the healing power of nature”, whilst Buck (2016) suggested that gardening enabled access to a safe space to recover from illness. The ability to use the community gardening to aid with recovery and rehabilitation was important in allowing participants to develop a sense of achievement that links with previous research which suggests that going through the process of rehabilitation allows the opportunity to change image and become respected (Eriksson *et al.,* 2010).

Recovery capital is the breadth and depth of internal and external resources that can be drawn upon to initiate and sustain recovery from severe AOD problems (Granfield & Cloud, 1999; Cloud & Granfield, 2004). The concept of recovery capital reflects a shift in focus from the pathology of addiction to a focus on the internal and external assets required to initiate and sustain long-

term recovery from alcohol and other drug problems. This shift in focus lines up well with the basic concept of what a community gardening intervention can bring to supporting those recovering from AOD problems.

In addition to the mental health benefits that were experienced by participants, there were also several physical benefits. Participants felt that engaging with '*Nourishing Neighbourhoods'* had enabled them to build up their fitness levels, and therefore felt stronger as a result. The impact of increasing physical activity levels was strongly supported throughout both the qualitative and quantitative data. Participants spoke about becoming more active, whilst the data from the IPAQ indicated that participants were engaging in more vigorous physical activity. This finding is supported by the work of Mytton *et al.,* 2012, who suggested that gardening helped to reduce sedentary behaviours, as well as Wakefield *et al.,* (2007) and Twiss *et al.,* (2003) who reported that community gardening led to an increase in physical activity levels. Van den berg (2010) also argued that community gardeners increase physical activity levels compared to neighbours during the summer.

Participants also spoke about feeling physically stronger because of attending the intervention. Chen and Janke (2012, 2014) reported that gardeners are 30% less likely to fall due to improved balance from gardening.

There was evidence of weight loss in the quantitative data, albeit small, but not for the duration of the intervention. Further support for the idea that community gardening can contribute to weight loss goals was presented in the qualitative data, with participants discussing their weight loss journey, with attendance at their *'Nourishing Neighbourhood*s' sessions being an integral

part. Zick et *al.,* (2013) reported that gardeners had lower BMIs than neighbours and siblings. Spears Lanoix *et al.,* (2015) showed that the BMI of children reduced after taking part in a gardening intervention.

Participants reported in Study Three that engaging in '*Nourishing Neighbourhoods'* had increased their access to fresh fruit and vegetables. This supports previous research by Wakefield *et al., (2007)* which showed that community gardens increased access to food and therefore resulted in improved nutrition for participants. Barnidge *et al.,* (2013) Castro *et al.,* (2013) Alaimo *et al.,* (2008) Carney (2012) and Twiss *et al.,* (2003) also found that community gardening led to an increase in fruit and vegetable intake.

Focus group data also suggested that participants were enjoying an increase in consumption and variety of fresh fruit and vegetables. This was true with the quantitative data collected in the FACET survey between baseline and week 16, but consumption dropped off between week 16 and week 24. This decrease has been discussed earlier, with the potential link to collecting week 24 data just after the Christmas period.

7.5.2 To identify any unintended consequences to taking part in a community gardening programme

Several potential unintended consequences have presented themselves through the interpretation of the data in Study Two and Three. These include (and are discussed in greater detail in other sections of this chapter):

- The action of collecting BMI data having the potential to impact on a participant's self-esteem.

- Completing a health intervention during a time of high-risk, i.e. when good nutrition and physical activity levels could be negatively affected, may be detrimental to participant motivation and sense of achievement.
- Feelings of guilt felt by participants if they were carrying an injury (physical or mental) and were unable to participate in the sessions.
- Interventions which promote physical activity can be effective in low income groups but have the potential to increase intervention-generated inequalities.

One issue that I had to reconcile on a personal level before starting the intervention on four sites was the fact that I would be delivering an intervention for six months, and then I would be walking away from the sites and the participants. I knew this would be difficult to do with my Groundwork North East "hat" on. The question I asked myself was, 'Is it ethical to start developing a community gardening programme, with the knowledge that it may not be sustainable?' At present (March 2018), three of the sites are still up and running, with one that was unable to continue following the completion of the '*Nourishing Neighbourhoods'* programme. The question that I now ask myself is, 'Do the community feel let down by the start-up of an intervention that couldn't be sustained? Did it raise aspirations that could not be met?'

7.5.3 To enhance understanding of the barriers to engaging with a community gardening programme

The findings from this study support previous research in the field of barriers to participation. Environmental factors such as weather conditions were

discussed as a barrier in the focus groups, and also explored in the section on adherence levels, with the attendance figures decreasing during 'non-favourable' weather condition sessions. Suggestions to counteract the consequences of poor weather include ensuring there is an indoor space to hold a session in if the weather becomes extreme, such as a poly tunnel. Also, ensuring that the correct protective clothing and equipment is available for participants.

The amount of travelling (i.e. distance) to a site was also a barrier to engagement. Even though the participants who took part in '*Nourishing Neighbourhoods'* lived within one mile of their site, this still proved difficult on some occasions. This was linked to poor weather, i.e. if the weather was poor, travelling on foot to the site was more troublesome. In addition, some participants had mobility issues, and used public transport to get to their community gardening site. Issues with public transport then had an impact on attendance, as well as having the finances to pay bus fare.

Family commitments and increased family relationships were a potential barrier to engagement, which was found in a previous study by Carney *et al.,* (2012). These issues were discussed extensively in the focus groups, and suggestions to help remove this barrier was the inclusion of family friendly sessions and linking in with school holidays to make sure sessions catered for children and young people.

7.5.4 To establish practicalities required to inform and deliver a successful community intervention in the future

The methods used to collect data in Study Two and Three involved engagement with focus groups, completing self-report surveys, and having weight and height measured to establish BMI scores of individuals.

The general consensus amongst participants about the surveys was that for the majority, they were quick to complete which was in line with findings from previous studies (Bowling, 2005; NOO, 2011; IPAQ, 2004). However, some participants commented that particular surveys were hard to understand, and that some of the questions were not presenting a viable option for them to answer. This raises questions about the ease of use with the surveys. In particular, the FACET and the IPAQ surveys.

With the FACET survey, the question that was deemed as having the potential to suggest inaccurate data was, ‘Do you think you will increase the amount of fruit and vegetables you eat in the next year’? It was felt that this didn’t allow room for participants who already ate a good level of fruit and vegetables. It was commented that if they responded ‘No’ to the question, this would be viewed negatively. A suggestion to this issue could be to re-word the question to: ‘Do you think you will increase the amount of fruit and vegetables you eat to reach the recommended level in the next year’?, with an additional response box to be added for ‘I already eat the recommended level of fruits and vegetables’. Although there were perceived issues with the FACET questionnaire, there were no missing data recorded for baseline, week eight, 16 or 24, which supports the evidence that the survey is easy to complete (NOO, 2011).

The IPAQ also caused some issues with participants, and this was reflected with several questionnaires being returned with questions unanswered. The layout of the survey meant that sometimes participants did not always read part b) of the questions and linked it to part a) of the question. For example, '3a) During the last seven days, on how many days did you walk for at least 10 minutes at a time?' The participant is then provided with a box to give the number of days. The second part of the question is '3b) How much time in total did you usually spend walking on one of those days', with the option to answer in hours and minutes. I believe that the errors were occurring when participants were not reading part b) thoroughly, and just see 'How much time in total' and linking that back to the previous question which asks you to examine your behaviour over seven days rather than one.

Whilst looking at ways that this survey could be improved for future data collection, and understanding of questions amongst participants, I came across a later version of the IPAQ. The latest version has already made changes to the layout and wording of the questionnaire, which mirrored my belief that the wording needed to be simplified.

Collecting BMI data was also perceived by most participants to be an acceptable form of data collection during a health intervention. In some instances, having their BMI calculated every eight weeks provided an incentive for them to push on with any dietary goals that they had set themselves. For a couple of female participants, the process of collecting BMI data was uncomfortable, as there were personal issues around body image. Some research argues that many women are constantly trying to reach their ideal weight and failing (Malkemus *et al.,* 2008), whilst likely to be suffering with low

self-esteem. Powell and Howard (2007) found that the higher the participant's BMI, the lower the level of self-esteem and self-perception the participant had in comparison with the participants who had a lower BMI. Similar findings were observed by McLaren, Hardy, & Kuh (2003) in their longitudinal study about women's body satisfaction as well as by Miller and Downey's (1999) study comparing heavy weight and self-esteem. This issue linking BMI scores and how females view their bodies needs to be taken into consideration with health interventions such as '*Nourishing Neighbourhoods'*. Collecting BMI data within a study such as this has the potential to impact on a participant's self-esteem if they are unhappy with the BMI recorded. To ensure that this data collection method remains as comfortable as possible for participants, measures need to be in place to provide a private and safe environment for the collection, with the reassurance that all data collected will be confidential, and individuals not recognisable within the data sets.

A couple of participants in Study Three felt that focus groups could be off putting as a way of collecting data, especially before starting any kind of intervention. There was an appreciation of post-delivery focus groups however, as this gave participants an opportunity to reflect on their own journey through '*Nourishing Neighbourhoods'*.

One aspect of the focus groups that I would like to pick up on in the discussion is with the novel way that the post-delivery focus groups were carried out. On all four sites, when possible, the post-delivery focus groups were carried out outside. After carrying out a brief review of the literature on focus groups employed in health research, I was unable to find any that explicitly detailed the completion of them in an outside space. This could be due to the

constraints that conducting a focus group outdoors would bring to the data collection phase. However, I believe that the advantages gained have allowed for a greater investment from participants in the focus group discussions for several reasons.

Examining the disadvantages first, the outdoor focus groups were:

- A little bit more difficult to hear clear play back on the recorder, with background noise such as wind.
- On one occasion, was interrupted due to a change in weather, with the group then needing to move to an indoor space because of rain.
- A little trickier in finding a central spot where the recorder to go, with seating around it.

The advantages of conducting focus groups outdoors, in my opinion, outweighed the negatives, and solutions were found for the potential issues mentioned above:

- Participants felt at ease a lot quicker than they appeared in an indoor environment. The atmosphere felt relaxed and made for a safe space for people to speak up and give their honest opinions of the intervention.
- There were opportunities to pick up visual cues whilst out in the community gardening area, to act as reminders and help aid discussion.
- In some cases, the seating area used for the focus group was one that had been built as part of the intervention. This helped to create an initial sense of achievement before discussion even began.

In preparation for delivering the focus groups outdoors, I made arrangements for if the weather took a turn and the participants needed an indoor space. I also carried a brief demo of recording voices before the focus group officially started, to see what background noise was being recorded, and whether this would have a detrimental impact on the quality of the recording.

This experience of data collection in the '*Nourishing Neighbourhoods'* research has the potential to pave the way for a novel way to collect qualitative data and contributes to the exploration of innovative ways to engage with participants in a community setting.

Lastly, throughout the qualitative element of this research, in both Study One and Study Three, recommendations of how best to deliver a community gardening intervention were forthcoming from participants. In Study Three, there were four elements of the intervention that were discussed in the focus groups. These were: *advertising; session planning; the timing of the session and security on site.*

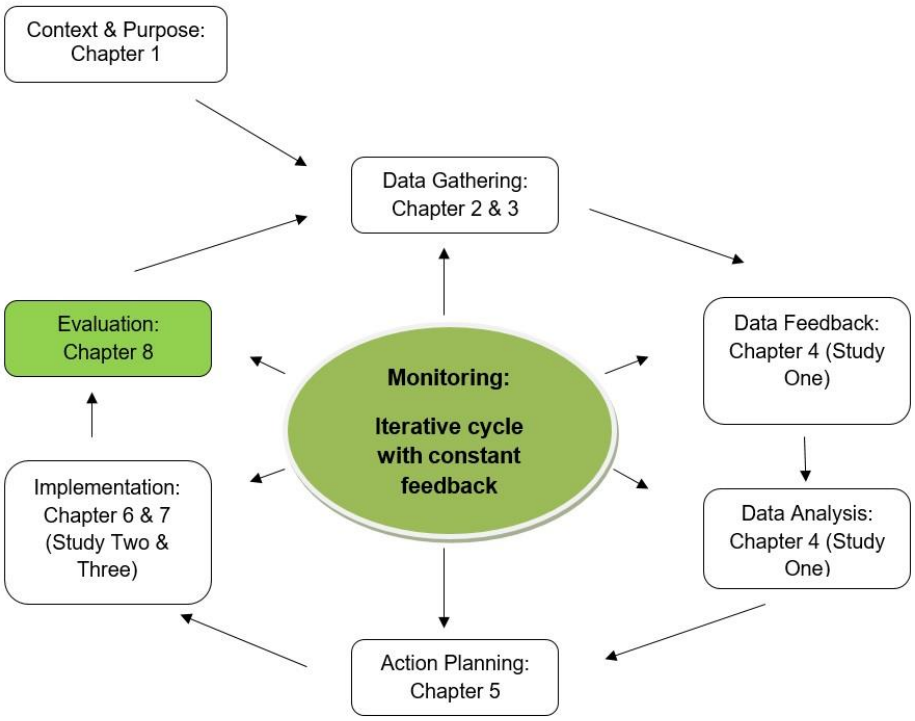
To ensure that community health interventions have the best start possible, ground work is needed to make the most of advertising opportunities. The planning of sessions was crucial to the smooth running of a session, but also to the engagement of participants with something that had been well thought out, flexible, but also specific to that community's particular needs. The timing of the session was critical to the success of the intervention, i.e. the time of day and the day of the week. Finally, the security that each site had was imperative to the motivation of participants to keep engaging with '*Nourishing Neighbourhoods'* over a period, and to encourage consistent attendance.

CHAPTER EIGHT: DISCUSSION AND CONCLUSION

8.1 Introduction

This chapter will discuss the findings from chapters six and seven to explore the potential that community gardens have to improve the physical and mental health of individuals, but also to bring about a positive change at a community level. I will establish links between the results described previously within the scope of existing literature discussed in chapters one through to five, with findings organised as they relate to the thesis aims and objectives. This chapter brings to a close the iterative cycle that has taken place throughout this PhD, as demonstrated in Figure 8.1.

Figure 8.1: The Action Research Cycle; Chapter eight highlighted within the iterative evaluation cycle of this thesis

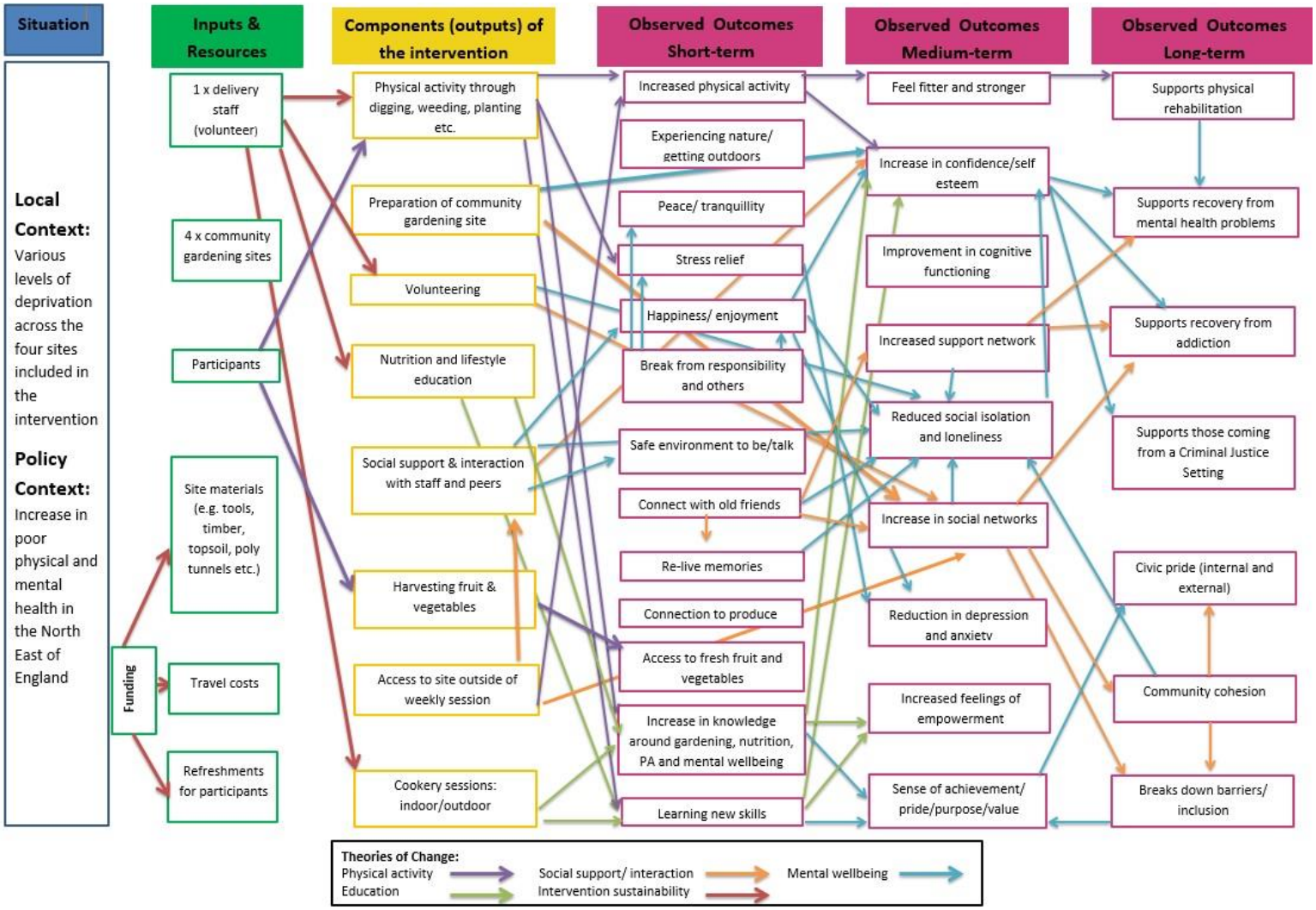


Where possible, I discuss the triangulation of data between Study Two and Study Three. While the quantitative (Study Two) and qualitative (Study Three) elements of the study were undertaken and analysed separately they have been brought together at the ‘analysis/interpretation’ phase in a 'triangulation' process (O’Cathain, Murphy and Nicholl, 2010). In this thesis, data were reconciled by using a model which relies on the principle of complementarity (Moffatt *et al*., 2006). Within this approach it is explicitly recognised that qualitative and quantitative methods may be used to examine different aspects of an overall research question (O’Cathain, Murphy and Nicholl, 2010).

8.2 The ‘*Nourishing Neighbourhoods’* Logic Model

Using the findings from the quantitative date in chapter six and the qualitative data in chapter seven, the logic model that was developed in chapter five has been revised to demonstrate how the five theories of change: physical activity, social support/interaction, mental wellbeing, education and intervention sustainability, are linked to the numerous theories of action; the potential outcomes from engaging in community gardening. Figure 8.2 lists the input and resources required for ‘*Nourishing Neighbourhoods’* as well as the components of delivery. The potential outcomes that were listed in the logic model in chapter five have now been revised to describe the observed short-term, medium-term and long-term outcomes from the community gardening intervention, *‘Nourishing Neighbourhoods’.*

Figure 8.2 Revised logic model for 'Nourishing Neighbourhoods'



8.2.1 Lovell v Connor

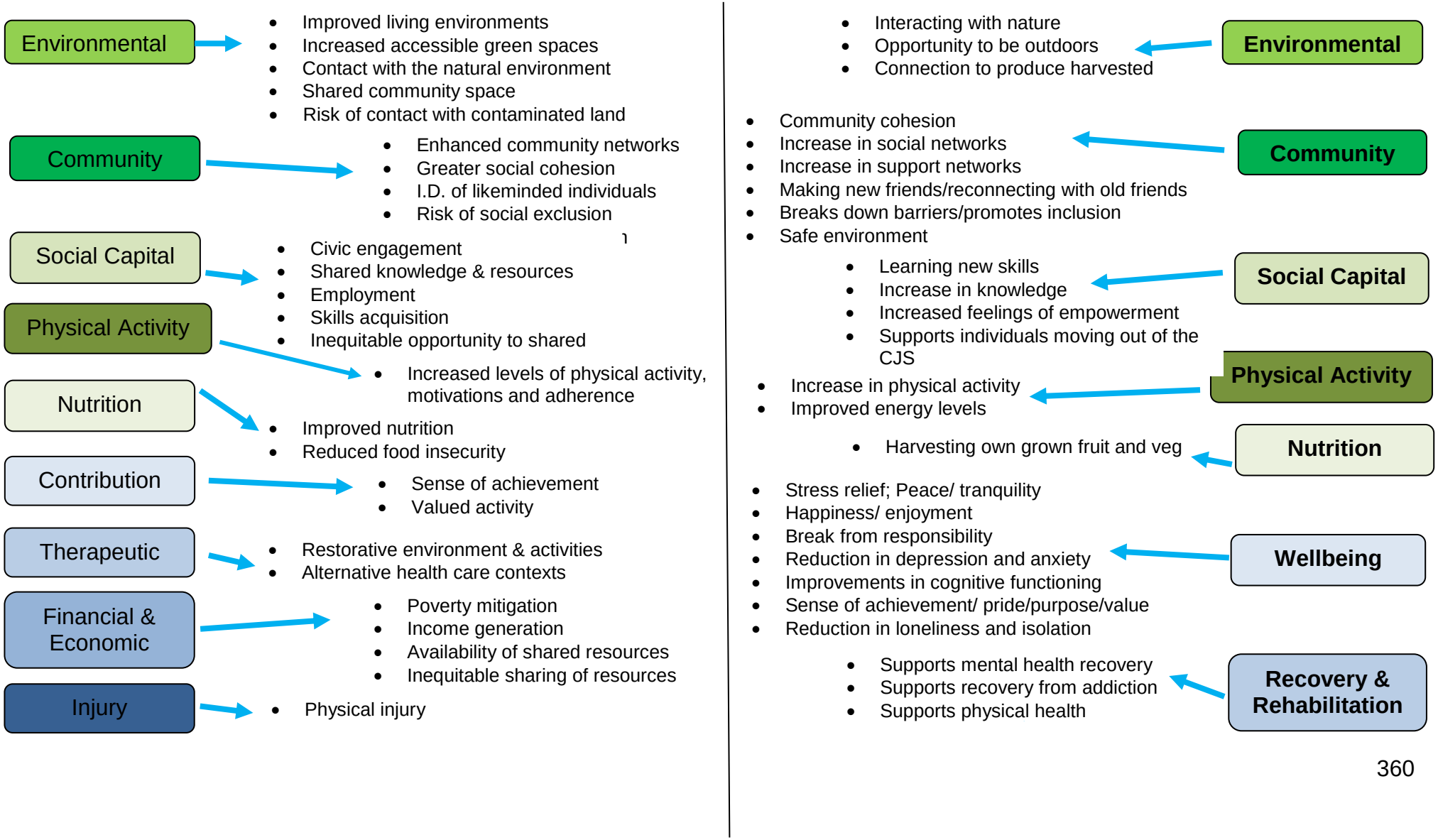
Lovell *et als.,* (2014) model consisted of 'Components of community gardening', 'Potential Outcomes', 'Potential health or wellbeing impacts' and 'Potential impacts on health inequality'. Table 8.1 highlights the slight difference between components in the Lovell model, and revised logic model.

Table 8.1 Differences in community gardening components between Lovell et al., (2014) and Connor (2019).

	Lovell et al., (2014)	**Connor (2019)**
Components	1. Voluntary activity 2. Garden and project management 3. Social Contact 4. Physical activity 5. Production of fruit and vegetables 6. Selling/distributing produce 7. Training and educational	1. Volunteering 2. Preparation of community gardening site 3. Social support and interaction with staff and peers 4. Physical activity 5. Harvesting fruit and vegetables 6. Nutrition and lifestyle education 7. Cookery sessions (indoor and outdoor) 8. Access to site outside of a weekly session

The revised logic model has demonstrated a variety of potential outcomes from community gardening. Figure 8.3 compares the Lovell *et al.,* (2014) model with the revised logic model presented in Figure 8.1. The five theories of change: physical activity, education, social support/ interaction, intervention sustainability and mental wellbeing, have linked into a detailed demonstration of theories of change. These outcomes (or mechanisms) have been categorised into short, medium and long-term, for the benefit of the logic model.

Figure 8.3 Lovell *et al.*, (2014) v Connor (2019)



8.2.2 Examining the Outcomes

A number of outcomes from the Lovell *et al.,* (2014) model were supported from the quantitative and qualitative data. There was strong support for four of the themes in the model: Environmental; Community, Contribution and Social Capital.

Within 'Environment', data from the focus groups suggested that the community gardening area; the actual environment itself, was restorative, as was the mechanism of gardening (Gonzalez *et al.,* 2011). The contact with the natural environment (Norfolk, 2000) was something that was greatly appreciated and enjoyed.

The theme of 'Community' was strongly supported as an area that felt the benefits from community gardening. Participants liked having a: shared community space, (Buck, 2016), taking part in the intervention helped to enhance community networks (Armstrong 2000, Milligan, 2004), with the belief that groups were experiencing greater social cohesion and community engagement because of '*Nourishing Neighbourhoods'.*

Data which suggested a sense of achievement (Kingsley et al.,2009; Van den Berg, 2010) was gained from taking part in a community gardening intervention, as well as participants feeling they were engaging in a valued activity highlighted the strength of support for 'Contribution' in Lovell et *als.,* (2014) model.

Finally, there was strong support from the qualitative data collected that the theme of 'Social Capital', with outcomes including shared knowledge and

resources (Newman and Hatton-Yeo, 2008) and skills acquisition, should be an important and central part of any community gardening health and wellbeing outcomes model.

There was also support, to a lesser extent, for other potential outcomes within the four themes already mentioned above for improved living environments and an Increase to accessible greenspace (environmental theme); civic engagement and identification of likeminded individuals (community theme); Contribution and employment (social capital theme).

Additionally, there was limited support for outcomes within the financial and economic, therapeutic, physical activity, and nutrition outcomes presented by Lovell *et al.,* (2014).

- *Financial and Economic:* skills acquisition, availability of shared resources, inequitable input
- *Therapeutic:* alternative health care contexts
- *Physical activity:* increased levels of PA, motivations and adherence
- *Nutritional:* improved nutrition, reduced food insecurity

There was no data collected during the three studies which supported potential outcomes of increased stress and anxiety (therapeutic theme), risk of contact with contaminated land, soils or chemicals (environmental theme), increased social isolation, or risk of social exclusion (community theme), inequitable opportunities to use shared capital (social capital theme), physical injury (injury theme), poverty mitigation or income generation (financial and economic theme). This is not to say that these health and wellbeing outcomes, positive or negative, are not linked to community gardening in some way, as we have

seen first-hand reading through this thesis that community gardening is a complex intervention to dissect. However, previous evidence of these outcomes is scarce at best, and this thesis supports that.

8.2.3 Examining the Theories

A number of theories that were presented in chapter one were supported through the findings in this thesis. The theory that had a strong connection and aligned itself with community gardening was self-efficacy. A variety of health and wellbeing outcomes that emerged from the data included an increase in physical activity through community gardening; a mechanism to support those coming from the Criminal Justice System (CJS); an opportunity to learn new skills; increased feelings of empowerment; participants harvesting their own grown fruit and vegetables; an increase in knowledge around community gardening; a sense of achievement, feelings of pride, purpose and value; and a reduction in feelings of loneliness and social isolation. All of these health outcomes align themselves with self-efficacy, as they are outcomes which help to improve an individual's belief in their ability to succeed or accomplish tasks (Bandura, 1997).

Social connectedness and social capital were also theories that linked in closely with '*Nourishing Neighbourhoods'*. These theories are similar in the fact that they underpin mechanisms that can improve an individual's social health, as well as a communities social health. Health outcomes aligned with these theories and supported with the data that emerged from this thesis include:

- Participants making new friends and reconnecting with old friends (Draper and Freedman, 2010)
- An increased sense of community cohesion (Milligan *et al.,* 2004, Teig *et al.,* 2009)
- An increase in social networks and support networks (Armstrong, 2000, Milligan *et al.,* 2004)

A final theory that aligned closely with community gardening was ART. Being surrounded by nature and the environment is an activity that can help the brain and body to recover from mental fatigue, help to improve concentration levels, and provide enjoyment (Kaplan, 1985). This hypothesis gains support from this thesis by the following outcomes emerging from the focus group and autoethnographic data:

- Improvements in cognitive functioning (WHO 2015b)
- Stress relief (Van den Berg *et al.,* 2011)
- Happiness and enjoyment (Westlund, 2015)
- A break from responsibilities

A number of theories were somewhat supported by the outcomes of community gardening. Four out of the eight theories that were discussed in chapter one were neither strong or weak, with outcomes suggesting that these theories could have a very basic link to community gardening, but the data from this thesis did not provide a definitive and conclusive answer. Biophilia, the innate urge to connect with nature (Wilson, 1984) was certainly considered due to the emergence of data describing participants enjoyment at linking to nature and the outdoors via community gardening (Leaske *et al.,* 2009), feeling

like community gardening provided a safe environment within which to take part in an activity, as well as the gardening allowing the development of a first hand connection to the produce (Wilson, 1984) that was harvested, week in, week out.

SAD was another theory which had a tenuous link into community gardening. The theory postulates that due to a lack of sunlight, the hypothalamus within the brain is unable to function effectively (Pandi-Perumal *et al.,* 2007, Coppen, 1967, Duffy and Czeisler, 2009). Community gardening provides an opportunity to be exposed to sunlight. The qualitative finding of community gardening helping to reduce anxiety and depression aligns itself with one of the symptoms that SAD sufferers have to deal with. Other symptoms of SAD can be a lack of energy and a lack of concentration (NHS, 2019), and with participants reporting more energy and improvements in cognitive functioning as additional outcomes from taking part in '*Nourishing Neighbourhoods'*, there is some support that SAD sufferers could benefit from taking part in a community gardening intervention.

An interesting, and newly emerging finding from the '*Nourishing Neighbourhoods'* data was the potential of the community garden environment to offer a supportive and encouraging place for people to come to whilst on a recovery journey. Whether that be from surgery, a mental health problem, or a drug and/or alcohol addiction. Recovery capital has four components (NHS, 2018), and it is these components which create the building blocks to help with recovery. The components are similar to the components and potential outcomes from community gardening:

(1) Social capital; the relationships we have with family and friends

(2) Physical capital; these can include housing, employment, access to nutrition and hobbies

(3) Human capital; skills, knowledge and positive health

(4) Cultural capital; this is the values, beliefs and attitudes that linkt o social integration

These four components link in very closely with community gardening outcomes, so recovery capital theory is a pertinent theory to support and underpin community gardening interventions.

With regards to habit formation, there was no strong evidence within the qualitative findings which supported the theory. However, the quantitative data suggested there could be a link due to the adherence statistics. Participant drop-rate rate stopped after week eight of the intervention, which fits with the habit formation theory that it takes an average of 66 days before a new habit can be formed (Lally and Gardner, 2011). In this case, the new habit formed was attending the *'Nourishing Neighbourhoods'* intervention.

8.2.4 Emerging Ideas from the Nourishing Neighbourhoods Findings

A number of relatively new ideas emerged from the data which had not been explored before in previous studies, and perhaps were not explicitly stated in the Lovell *et al.,* (2014) community gardening model. These included:

- Civic pride
- Breaking down barriers/ inclusion

- Providing routine for recovery (mental health and addiction)

Civic Pride

It is well known that the quality of local environments can affect people's physical, mental and emotional health (Remoundou, 2009). It contributes to whether a place feels safe or not, as well as influences whether an individual wants to visit a certain location. Previous literature has discussed the impact of community gardening interventions on those who participate. What has emerged from this thesis is the impact that the intervention has on those who live in the community, but who are potentially experiencing increased levels of civic pride in their area and local environment, from an intervention that they are not even engaging with.

Local governments in the UK have been under considerable pressures in the post-2008 austerity years, which has in turn led to rising social inequalities; an issue which could be damaging to civic pride (Collins, 2016). Civic pride is sometimes an outcome that can be overlooked, but it has the potential to bring about social and mental health improvements to a wider audience than the smaller number of participants who are actively engaged in a health intervention.

Breaking down barriers/ inclusion

The power for a community- based gardening intervention to break down barriers was another finding that emerged from the qualitative findings. An atmosphere of inclusion was facilitated by *'Nourishing Neighbourhoods'*. The political climate in the UK today is quite unstable. Recent events such as

Brexit, the 2017 General Election and the more upcoming 2019 General Election have created an unsettled climate. Community gardening projects could be a part of the puzzle in helping to counteract this. They could help to creating a collective identity in communities so that issues of race, ethnicity and religion are not seen as divisive. Community gardening could potentially create an opportunity for culturally diverse groups and people of different ages to come together and develop a sense of community and belonging (Crouch, 2003; Shinew *et al.,* 2004).

Routine for recovery

With regard to the *'Nourishing Neighbourhood'* programme, the sessions took place once a week, with the flexibility for participants to attend in their own time if they wished. The six month intervention gave participants time to build the connections and trust required to settle into a safe routine, whilst also providing an opportunity for behaviours to be performed automatically. (Lally and Gardner, 2011). This repetition creates a link between the situation and the action, i.e. developing recovery tools and community gardening. When the situation is encountered the action is performed automatically. With hindsight, a useful piece of data to collect would have been how often participants visited the site in their own time, to see if there was any correlation with participants who engaged with the intervention longer. Although a limitation within this piece of research, this provides an area for further research in this field.

8.3 What does this research add to the current evidence base?

- Community gardening, in the format of a programme such as *'Nourishing Neighbourhoods',* is viewed as a feasible public health intervention. The

methods used to recruit and retain participants, as well as collect data were deemed to be acceptable.

- It is evident that community gardening has the potential to have a positive impact on a number of health outcomes, many of which can be supported by previous literature.

- The sustainability of a community garden is affected by the workload that is needed to start the development, as this impacts on feelings of ownership and responsibility, as well as pride and purpose.

- One of themes that emerged from the qualitative research involved participants being able to relive memories and connect to their past. This, coupled with the fact that older participants were more likely to stay engaged with the intervention, could be of importance with the increase of an ageing population and the link to rises in dementia and Alzheimer's.

- Although not fully explored within this thesis, community gardening has the potential to be a cost-effective public health intervention.

8.4 Implications for Policy and Practice

The availability of land to be used for such purposes as community gardening is at an all-time low due to population increases (Rau and Fahy, 2013). So using space for more than one purpose is desirable. A community garden gives opportunities to improve unused space (that is sometimes neglected and an eyesore); to grow fresh fruit and vegetables; to give space to take part in physical activity ranging from moderate to vigorous; to provide a space to escape and find peace and quiet if needed but also a space to meet new

people and connect with the local community. Therefore it is important to merge planning with health so that effective design of health promoting green infrastructure is created (Kleinert and Horton, 2016).

By building in green space and infrastructure into effective planning for public health, the likelihood of improving health is matched by the prospect of reducing social inequalities. Improving the income of the poorest members of society is often proposed as a way of improving health, and therefore will reduce health inequalities (Benzeval *et al.,* 2014). However, it is not quite as straightforward as that. Having more money does not solve health issues that can be attributed to poor housing and sanitation, inadequate diets and hazardous jobs. '*Nourishing Neighbourhoods'* shows that community gardening, if used within appropriate policy, planning and strategy could improve health and wellbeing, as well as create more robust and resilient societies (Anderson *et al.,*2014; Tzoulas *et al.,* 2007, Maller *et al.,* 2006). The case for improving green infrastructure and access to it has been strengthened through the findings of this thesis.

Anderson *et al.,* (2014) argued that communities involved in enhancing infrastructure around them benefit from an increase in their individual health and wellbeing as well as increasing the sustainability of the built environment around them. I propose that this idea is key to developing a sustainable community gardening project. The sites involved in this research that started from scratch led to sustainable, long term projects that are still ongoing. I suggest that this longetivity will run parallel to longer term health and wellbeing benefits, at both an individual and community level.

The increase in food poverty in the UK has been highlighted by the increase of food banks and their usage. The number of food banks has risen from 56 in 2010 to 445 in 2015 (The Trussell Trust, 2015). It has also been reported that food bank usage has increased for the ninth consecutive year, with food banks giving out more than 11,000 tonnes of food in 2016-17 (The Trussell Trust, 2017). The reasons for this increase in usage is complex, and not a topic to be discussed at great length in this thesis. Community gardens are in no way an answer to address food poverty. However, they could be used as a short term answer to the problem. Fresh produce could be donated to food banks, or those who are in need could be encouraged to get involved with local schemes.

The impact of the ageing population on health and social care services has so far seen a negative impact on costs. There are a number of reasons for this. Firstly, the cost of annual health and social care is significantly greater for older people. Add this to the increase in hospital admissions and the increase in elderly people living on their own and requiring formal care has seen the suggested number of older people with care needs to rise by 60% in the next 20 years (ONS, 2011). This is putting a huge strain on the NHS. Every year, falls are costing the NHS over £2 billion, with potentially even greater costs associated with social care (Tian *et al.,* 2014). Community gardening schemes may help to ameliorate some of these negative trends. Although the research which focuses purely on community gardening with the elderly is rare (Nicklett *et al.,* 2014), there is some evidence to suggest that it can help to reduce the number of falls in older people (Chen and Janke, 2012; 2014) as well as improve mental health issues such as loneliness and isolation (Milligan 2004;

Wakefield *et al.,* 2007; Brown *et al.,* 2004; Pettigrew *et al.,* 2008). As Wakefield *et al.,* (2007) suggested, community gardening could be ‘an effective ill health prevention tool for the long term’.

Buck (2016) argued the case for gardening across the life course- from childhood into adult hood and into older age. It is at this later end of the spectrum where community gardening has the potential to make a big impact on issues such as dementia and end-of-life care. There is a growing body of evidence that suggests that physical activity may have a role to play in preventing or at least reducing the impact of dementia. In addition to this, it has been argued that globally, 13% of Alzheimers disease may be due to sedentary behaviour (Raji *et al.,* 2016).

Community gardening has the potential to make an impact right from an early age. The link between growing fresh fruit and vegetables and education is important. Any place that has interactions with children and young people should be set up to cater for knowledge and skill building related to gardening. Schools should not only be encouraged, but regulated to develop their own growing plots, with produce used for cooking. A fantastic example can be seen in Japan, where not only do the schools use home grown produce, but the pupils help to prepare the food and serve their classmates (Washington Post, 2017). Even with Japans low child obesity rate, it has continued to decline over the past six years with its expanded dietary education programme. Japans children will live to an average of 83, longer than any other country (WHO, 2014).

8.5 Recommendations

8.5.1 Key theoretical findings

- Theories such as self-efficacy, social connectedness and social capital were strongly aligned with the intervention, suggesting that the health and wellbeing outcomes that emerge most prominently from a community gardening programme are linked with social and mental health impacts. When designing any future community gardening interventions, this should be considered, with the relevant theories used to underpin any rationale.

- Habit formation had a lower level connection with the intervention, which could be explored in further detail in future research.

- Nutrition and physical fitness were outcomes that had some support from the data in this thesis, but the physical act of gardening itself is only a very small element of the motivating factors that attract people to such an intervention as '*Nourishing Neighbourhoods'.* There are other factors such as meeting new people, learning new skills, having somewhere tranquil to escape to, and having an activity to do with children. These factors should be addressed when marketing and promoting such interventions.

- I would suggest that the findings in this thesis of participants developing a greater level of social functioning when resources were limited, and more work was required, point to the positive development of social cohesion and social capital amongst community gardeners.

8.5.2 Key Findings on the Logistics of a Community Gardening Intervention

Some key points to take away from the findings in this research are:

- The member of staff or volunteer who delivers such an intervention plays a crucial role. They need to be able to adapt to the group.
- There needs to be some key members of the community to take on important roles for the sustainability of such gardening sites.
- Recruitment rates were quite low, but retention and adherence of the intervention were high.
- Drop out of the intervention was completed by week eight, supporting the notion of habit formation during that time.
- Study Three found that attention needs to be given to *advertising; session planning; the timing of the session and security on site when developing a community gardening intervention.*
- Communal gardening spaces need to be integrated at a higher level in terms of planning any new housing developments. It shouldn't just be a case of Section 106 monies (as part of the Town and Country Planning Act 1990) being sought to improve facilities in a new housing area. It should be a legal requirement. One such example is the recent Lovedon Fields in Winchester (Hortweek.com, 2017), where 50 new homes have been complimented with allotments, a biodiverse country park area,

wild flower meadows, play areas, a running circuit, a cycle path, a community orchard and a village green.

- The pathways to refer onto these schemes are not well established. As the project went on, more people would join in through word of mouth. This suggests that short term community gardening projects are less likely to succeed. A realistic long term timeframe is required to invest in a community gardening intervention to achieve a desirable health improvement.

- The development of the intervention is crucial. Communities should be involved from the start, utilising a participatory action approach. Intervention development tools such as 6SQuID and TIDieR need to become accessible to local communities in a way that is easy to understand and replicate.

8.5.3 Key findings on implementing any community-based intervention

- It could be argued that the social and mental health outcomes observed within the community gardening intervention have the potential to also be observed in any community-based intervention. Participants were left feeling empowered because of taking part in a community-based scheme. There is enormous potential for such interventions to address a number of health and wellbeing outcomes, and therefore potential to reduce health inequalities, and close the evergrowing health inequalities gap.

- '*Nourishing Neighbourhoods'* has demonstrated that a community-based intervention, with the right theories to underpin, and the right components embedded in delivery, has the power to be a long-lasting and sustainable health intervention.

- A final key point, and recommendation from the findings is that the knowledge gained form this thesis needs to be understood by local communities. It is important that the message of how beneficial community-based interventions, (such as community gardening) is delivered appropriately.

8.6 Knowledge Translation

In public health, the knowledge-practice gap is globally known (Di Ruggiero *et al.,* 2017). Despite the amount invested in public health research by the government, the sector has difficulties in bridging the gap between public health knowledge and practice. With the Public Health England commitment of a 116 % increase in public health research approvals between 2016 and 2017, (PHE, 2018), it remains important to understand how best to translate public health knowledge into practice. The inadequate implementation of public health knowledge through research evidence in practice could impact upon the improvement in public health delivery, and ultimately the health and well-being needs of the population (Macintyre, 2003).

As the gap between the production of knowledge and its implementation is attributed to the disconnection between where knowledge is produced, and

where it is to be utilised (Walshe and Davies, 2013), many interventions focus on mobilising knowledge - which is the range of approaches to encourage the creation, sharing and use of research-informed knowledge, alongside other forms of knowledge (Marshall, 2014). Mobilising knowledge requires effective communication. Health communication is "the scientific development, strategic dissemination, and critical evaluation of relevant, accurate, accessible, and understandable health information communicated to and from intended audiences to advance the health of the public (Bernhardt, 2004). If this is done effectively, it can play an important role in promoting healthy choices and creating better understanding of health policy issues (Krepps, 1988) Good communication can help individuals, health professionals, healthcare providers, governments and policymakers recognize that the maintenance of good health is a shared responsibility (WISH, 2015).

I felt that it was important to find a way to help mobilise the knowledge gained from this thesis and communicate it effectively, therefore decided to develop an infographic. Infographics is an abbreviated term for an information graphic (Scott *et al.,* 2016). Information is presented in a logical manner, similar to storytelling, using data visualisations, text and pictures (Krum, 2013). When exploring the world of social media, the most successful infographics, i.e. the number of 'shares', contain an average of 396 words (Ahmad, 2016) and a combination of visual data such as bar and pie charts and illustrations. When contemplating the fact that this thesis is over 100,000 words, 396 words might seem to fall short, but the phrase, 'a picture tells a thousand words', springs to mind. Three days after learning new information, research suggests that we

can remember up to six and a half times more through learning from an infographic than by reading text alone (Krum, 2013).

I knew that developing an infographic from the thesis findings would be a complicated task, so I created a table which would help to link each of the theories with outcomes. Occasionally, more than one theory would link to an outcome. The infographic was developed to highlight the components of community gardening, and also the potential health and wellbeing impacts. In addition to this, I also wanted to demonstrate which outcomes were linked together thematically. Figure 8.4 demonstrates the start of the journey to creating the infographic. Figure 8.5 is the infographic.

Figure 8.4 Link between theories and potential outcomes from taking part in community gardening

Components of community gardening	
Physical activity	Volunteering
Social support and interaction with staff and peers	Access to site outside of weekly session
Harvesting fruit and vegetables	Nutrition and lifestyle education
Preparation of community gardening site	Cookery sessions (indoor and outdoor)

Seven themes in the model			
Recovery and rehabilitation		Social capital	
Physical fitness		Community	
Environment		Nutrition	
Wellbeing			

Theories	**Attention restoration theory (ART)**	**Seasonal affective disorder (SAD)**	**Biophilia**	**Self-efficacy**	**Social connectedness**	**Social capital**	**Recovery capital**	**Habit formation**
Potential outcomes	***Improvements in cognitive functioning***		Interacting with nature	Increase in physical activity	***Making new friends***		***Supports recovery with mental health***	
	Stress relief	Reduction in depression and anxiety	Opportunity to be outdoors	Supports those coming from the CJS	***Reconnecting with old friends***		***Provides tools for sustaining recovery from addictions***	
	Peace/tranquillity	Increase in energy	Safe environment	Learning new skills/ increase in knowledge	***Community cohesion***		Supports recovery with physical health	
	Happiness/enjoyment		Connection to produce harvested	Increase in feelings of empowerment	***Breaks down barriers/promotes inclusion***			
	Break from responsibility			Harvesting own grown fruit and veg	***Increase in social networks***			
				Sense of achievement/pride/purpose/value				
				Reduction in loneliness and social isolation				

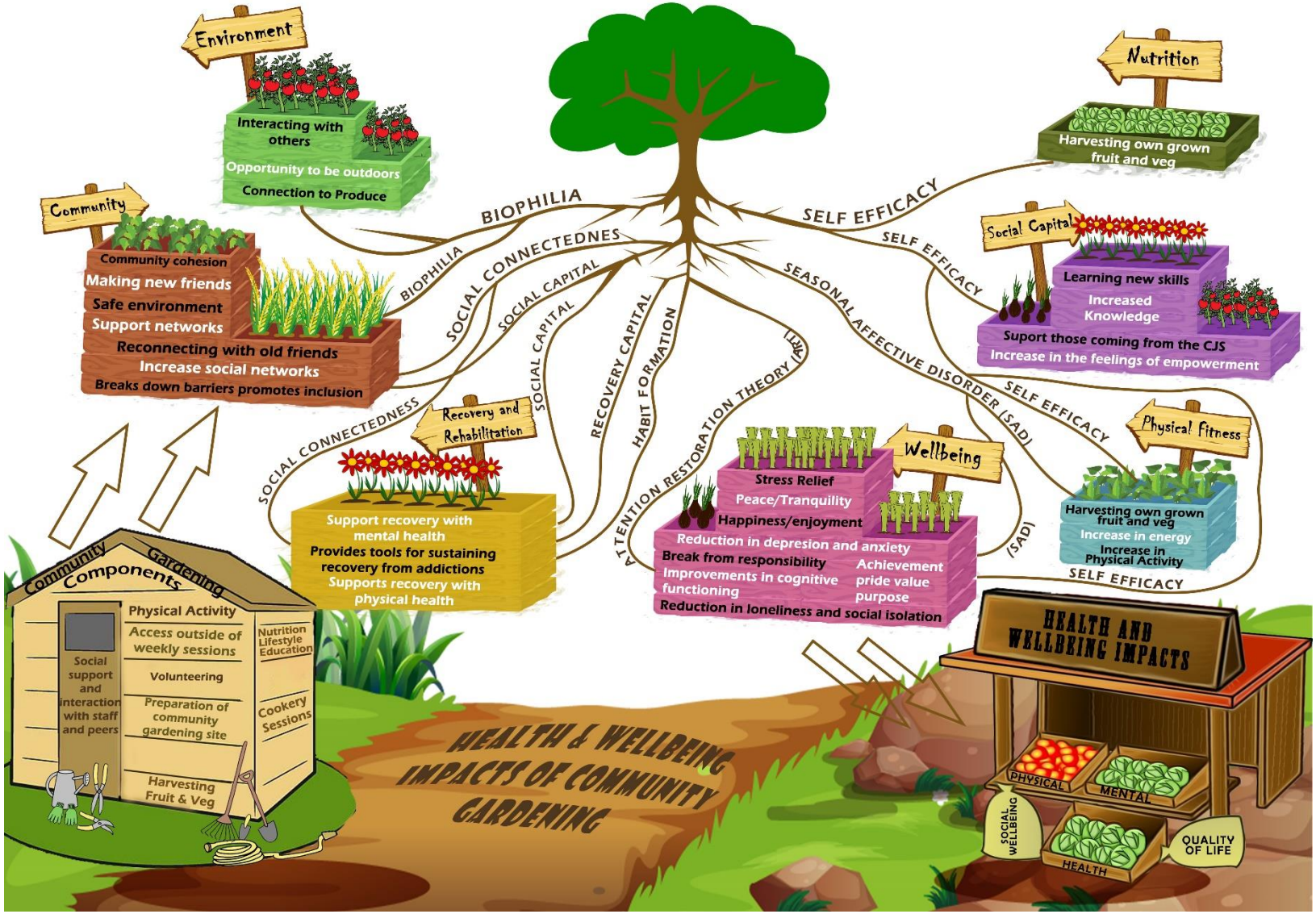


Figure 8.5

'Nourishing Neighbourhoods impacting on health and wellbeing through community gardening

The infographic provides an opportunity to help communicate the message of community gardening. The findings from this thesis demonstrate the myriad of potential health and wellbeing outcomes that community gardening can offer, but it is of a complex nature. By developing Figure 8.5, the findings from this thesis have the potential to reach a wider audience.

8.7 Strengths of the Research

The intervention was delivered over six months, allowing the research to be classed as a longitudinal study (Pope and Mays, 1995). Longitudinal research has a number of strengths. It can potentially provide richer information about individual behaviour by allowing the analysis of duration; permit the measurement of differences or change in a variable from one period to another, that is, patterns of change over time; and can be used to locate the causes of social phenomena (Menard, 1991) and sleeper effects (connections between events that are widely separated in time) (Hakim 1987). Insight into the processes of social change can therefore be enhanced by making extensive use of longitudinal data. There is also the possibility to build up a bigger picture and to get to know the research participants over a prolonged period of time.

As part of this relationship building, trust is more likely to be established so that during informal discussions and focus groups, rich data can be gathered. Six months allows the opportunity to look at data across more time points. Typically, at least four time points should be present in a longitudinal study that are equally spaced (Davison *et al.,* 2010). The possibility of developing research based on longitudinal data also builds a bridge between ‘quantitative’

and ‘qualitative’ research traditions and enables re-shaping of the concepts of qualitative and quantitative (Ruspini 1999).

The trust that was built with participants allowed for my role of being deliverer as well as evaluator to be effective. I was able to get a real insight into the workings of the community garden and gather valuable rich data. I was trusted by the participants, and so I felt that they could open up to me and talk about the good and the bad of community gardening and the impact that it had on them as an individual but also as a collective group. Later in this section, I discuss the potential of how this dual role could be seen as a limitation of the study, but I feel that that on balance, the positive impact outweighed the negative.

One of the strengths of this research was the element of collaboration and coproduction. Emerging evidence shows the importance of this, to try and move away from the notion of the research coming from an ‘Ivory Tower’.‘Ivory Tower’ has been defined in the Free Dictionary as “A place or attitude of retreat, especially preoccupation with lofty, remote, or intellectual considerations rather than practical everyday life”. (Free Dictionary, 2017). The research described in this thesis is based very much on practical, everyday life. Elements of coproduction were utilised within Study One when first developing ‘*Nourishing Neighbourhoods’*. Secondly, coproduction was in use whilst developing each community gardening sites plan of action for the 24 week programme. Each programme was unique and driven forward by the participants on each particular site. Coproduction is a much more interactive, dynamic and iterative process (Stokes and Dainty, 2011) than working in silos.

There was flexibility in the delivery of the intervention, which allowed a greater control over the site for participants. The delivery was grounded in what the needs of the locality were, and every site needed something a little bit different. A one size fits all intervention would not have worked, and that approach would have been the downfall of an RCT at this stage, as if we cannot see if an intervention will work on the ground, it would be futile to look at effectiveness.

The fact that each community gardening site was different meant that as a researcher, I was able to look at different groups within society. Across the four sites, there was a group that was mainly unemployed males; a group that had more children attend sessions throughout the programme; a group that was set up to support those with long term enduring mental health problems; and a group that was set up for an older population. Each site had its own focus and selling points. Although this made it difficult to compare sites with one another, it provided me with a much broader range of views and potential health outcomes that could be unpicked and explored through further research.

8.8 Limitations of the Research

A potential limitation of the research was the small sample size of participants. To have enough power for an RCT, a multi-centre approach with a substantial amount of money would be required. Based on a basic power calculation, approximately 550 participants would be required at the recruitment stage to run the necessary statistical analysis, and working on the average number of participants that each site in this research attracted (n = 10), approximately 55 sites would be needed. Although this could be seen as a limitation, I don't

believe that an RCT would be the most appropriate route to develop and extend research of this nature. The resources required to carry out such an RCT would be huge, and current evidence is telling us that flexibility is required when delivering such programmes. An RCT would not be able to accommodate this in a research setting.

Demographic data was not explored in as much detail, such as socio-economic status, employment history, family circumstances, physical and mental health conditions etc. In hindsight, this was data that could have been collected quite easily and may have provided further insight to help identify trends and potential barriers, as well as enable future interventions to be adapted for a targeted audience.

Another drawback from this piece of research is the lack of generalisability. This again links in with the project only having a small sample size, (on average, ten participants per site). This ties in with my experience at Groundwork North East delivering similar gardening projects. A question still remains as to whether such an intervention works out as economically viable. Can a financial case be made to introduce this as a health intervention which will not only reduce a number of health problems, physical and mental, but can also be cost efficient and save our health services money when cuts to the NHS and public health sector are on-going? The issue of scaling up '*Nourishing Neighbourhoods'* versus local sensitivity is complex due to the requirement of tailoring the intervention to local delivery sites. To counter argue this limitation, I suggest that due to the nature of community gardening sites being unique and not a 'one size fits all' intervention, the ability to

generalise all findings from one site to another is not as important a factor as it would be for other health interventions.

Convenience sampling is a type of nonprobability sampling in which participants are sampled because they are ‘convenient’ sources of data for researchers (Lavrakas, 2008). This method was used as it meant easier and quicker access to participants, and also, this method was much more feasible financially. However, a limitation of this sampling process was that the sample may not represent the population as a whole, so it is more difficult to generalise any results.

Although the research was classed as longitudinal, one of the drawbacks within this study was the intervention duration. Originally, it was going to be a 12 month intervention. Due to time pressures and financial constraints, 12 months was not a viable option, and the intervention was cut back to six months. Although we managed to get summer, autumn and winter months included in the delivery period, 12 months would have allowed the study to look at the impact of all four seasons on things such as recruitment and retention, as well as the different health outcomes.

The issue of seasonality is an important one within this thesis, especially in light of the results, and the pattern they displayed over the 24 weeks. The intervention started across all four sites during the month of July. This meant that for all sites, the final sessions took place in January, following on from the festive period. With regards to BMI, from baseline to week 16, this had slowly started to decrease. However, from week 16 (during November) to week 24 (January), there was an increase back to the average baseline figure of 27.

What is unfortunate is that I couldn't continue the intervention into spring, to see if the pre-Christmas BMI trend continued on the same trajectory or not.

As discussed previously in this chapter, being involved as the deliverer of the intervention as well as the evaluator meant some compromises were necessary. The situation required constant reflection throughout the process, and I am aware that the data may have potentially been compromised because of the "Hawthorne Effect". The "Hawthorne effect" was a phenomenon reported during a research programme in Chicago in the 1920's, where there was 'an increase in worker productivity produced by the psychological stimulus of being singled out and made to feel important' (Franke and Kaul, 1978). Participants may have felt pressure from being watched and wanting to do what they felt I 'wanted' them to do for the study, therefore modifying their behaviour.

A possible limitation that may have arisen through the completion of surveys was recall bias, which is a tendency to overestimate. Participants may have exaggerated their exercise levels, how their fruit and vegetable consumption had been, and their quality of life. Bird (2004) found that participants engaged in a physical activity programme surrounded by green space perceived themselves to be more physically active than they actually were. Recall bias is a limitation that can affect self-administered surveys, but given the constraints of the research, the surveys were the most appropriate method to use to collect the relevant data.

One of the challenges of this research, and indeed many studies which are attempting to look at whether a health intervention can be implemented

successfully and be effective, is that health impacts were observed, but it was difficult to isolate them as purely connected to the physical act of gardening. There are so many other variables at play- social factors, mental health, environmental factors, and other forms of physical activity that might have been facilitated through engaging with a community gardening programme.

Another limitation with this research was that all sites were at completely different stages in their set up. Some needed to start from scratch, where as some already have a good set up so that participants could come in and start planting straight away. This variable could potentially have had an impact on participants motivation which could have then possibly had an impact on session attendance and retention. A garden in a poor state could have had either a negative or positive impact.

Participants may have viewed a garden in a poor state as too much effort. A garden in good condition may have enticed more people to get involved as they can start to see results a lot quicker. Looking at this issue from an alternative viewpoint, a poor garden may have motivated participants. For those who had to start developing the site from the beginning, a lot more investment would have been required before starting to see any results. This kind of investment might actually have helped to facilitate retention rates. There would have been so much investment from the participants that there was a sense of ownership of the site. A sense of responsibility and commitment. Pride at not only growing the carrots but building the raised bed in which to grow the carrots. This variation in site readiness means that it is difficult to compare sites with one another, as each garden was so very different. It is this difference that Lawson and Drake (2013) argue, which

makes the function of each individual garden unique, and what adds to the complexity of research in this field.

On a personal level, a limitation was the need to invest my own money into the research. Self-funding any research topic can raise questions about the objectivity of that research. '*Nourishing Neighbourhoods'* included funding the sites and their development, as well as having to go part-time in my job to be able to deliver the intervention as a 'volunteer' for Groundwork North East for two days a week for six months. I had to ensure that I was continually reflecting on the process and my own bias, to make sure that I separated my own personal financial investment from the success of the programme (O'Hanlon, 1994). I had to remind myself that if the '*Nourishing Neighbourhood'* programme was not seen as beneficial or successful with participants, that the programme was not necessarily a failure. And additional insight may be gained that could be of use for the future.

The final limitation that I feel has potentially had an impact on this piece of research is the length of time involved with the PhD due to my part-time student status and juggling this with full-time work. From start to finish, this study will have taken approximately seven years. The question could be raised as to whether or not my research topic is still relevant after seven years. I actually believe that this research is timely, with a number of recent publications highlighting the importance of gardening as a mechanism to improve health, such as The Kings Fund paper 'Gardens and Health' (Buck, 2016) and how the NHS can use gardening to maximise impacts on health and wellbeing.

8.9 Future Research

A number of findings that arose throughout the thesis were outside of the research parameters of the project. However, they have provided additional lines of enquiry and thinking to be established and warrant further exploration. The following lines of research are summarised below:

A very basic cost analysis was carried out as part of this thesis. Further exploration could seek to determine a more robust analysis of costs associated with running a community gardening programme that is either led by volunteers and completely not for profit, by a third sector organisation who seek to cover revenue and capital costs or by a private enterprise such as a community interest company (cic).

The sustainability of the community garden sites once the data collection had finished was mixed. I set out with the intention that all four sites would be able to continue running once the six month intervention was complete. In reality, three have continued and are running smoothly, and one has completely stopped. An area for future investigation could be to look at what are the particular elements that contribute to making a community gardening programme sustainable.

Children were involved in the '*Nourishing Neighbourhood'* intervention, but data was not collected on people under the age of 18 as it was felt that there were further ethical implications on top of the difficult ethical journey already encountered. However, I was able to make observations of their activities and behaviours within the sessions. In addition, parents and guardians would talk about the impact the programme had on their children and the positive

difference it was making. Further research could explore the acceptability of '*Nourishing Neighbourhoods'* to a younger audience.

There were multiple communities identified in this thesis. Across the four sites, one was predominantly an unemployed group, one had older participants, one was much more family focussed, and the final site was mainly used by a mental health user group. The findings in this thesis suggest that '*Nourishing Neighbourhood's* had an impact on various mental health outcomes across several communities, such as depression, loneliness, isolation, stress and anxiety. This is something that could be looked at in further detail in the future, to try and unpick the complex relationship between gardening and mental health.

At the beginning of this thesis journey, I was firmly of the belief that to develop this into a large scale research project, then a RCT would be the gold standard to aim for, and would be the most appropriate methodology. I now believe that this is not the case. I believe that the tide is turning when it comes to the academic establishment downplaying qualitative evidence by arguing that it is not high enough on the hierarchy of evidence. Ohly *et al.,* (2016) carried out a systematic review of the benefits of school gardening. After looking at both quantitative and qualitative data, they concluded that the qualitative data was robust, and the quantitative data was of a very poor quality. In a similar vein, this research contributes to the growing qualitative data field, something that Buck (2016) argued is essential to develop and improve.

8.10 Conclusion

This chapter has provided an overview of the research, highlights the main findings, the contribution to knowledge and the implications of the findings from Studies One, Two and Three on policy and for further research.

As far as I am aware this is the first study to explore the acceptability and feasibility of a community gardening programme in this unique population. The research used both qualitative and quantitative methods to gain a deeper insight into how a community gardening programme such as '*Nourishing Neighbourhoods'* could be implemented in a local community setting. The research also explored the complex relationship that community gardening has on health at both the individual and group level.

The findings from Study One identified factors that would increase the success and sustainability of a community gardening programme which aimed to act as a mechanism to improve health. This data was used to inform the intervention '*Nourishing Neighbourhoods'.*

Findings from Study Two showed that 78 % of participants remained engaged with the programme, with older participants being more likely to stay involved and females more likely to complete the 24 week intervention. Taking part in *'Nourishing Neighbourhoods'* over a six month period had several effects on physical activity levels, with a decrease in days spent carrying out moderate activity as well as the number of minutes spent on moderate activity. There was also a decrease in days per week and minutes per day spent walking. However, there was an increase in days and minutes spent on vigorous activity. In addition, there was a decrease in the number of minutes spent

sitting per day. The results of the BMI data showed that although there was a decrease between baseline and week 16, by the end of the intervention, BMI had stayed the same for participants. Fruit and vegetable consumption remained at five portions per day from baseline to week 24, although similarly to BMI, there was an increase at week 16 to six portions. The SF- 8 results showed that there was a slight improvement in both the physical and mental component of participant's quality of life across all four community gardening sites, with a strong emphasis on improved social functioning across three of the sites.

Findings from Study Three highlighted the vast array of potential health improvements that could benefit individuals who took part in a community gardening programme. These benefits included a reduction in depression, loneliness and isolation; improved self-esteem and confidence; the development of new social networks and re-establishing old networks; a therapeutic environment to connect with nature; an outlet to relieve stress; increased access to fresh fruit and vegetables; an opportunity to learn new skills; an opportunity to take part in physical activity at various levels; and an avenue for recovery and rehabilitation. The finer details of the intervention, including delivery mechanism, timing, resources, barriers and facilitators to attendance and methods of data collection were analysed to ensure that any future programme had an improved level of fidelity.

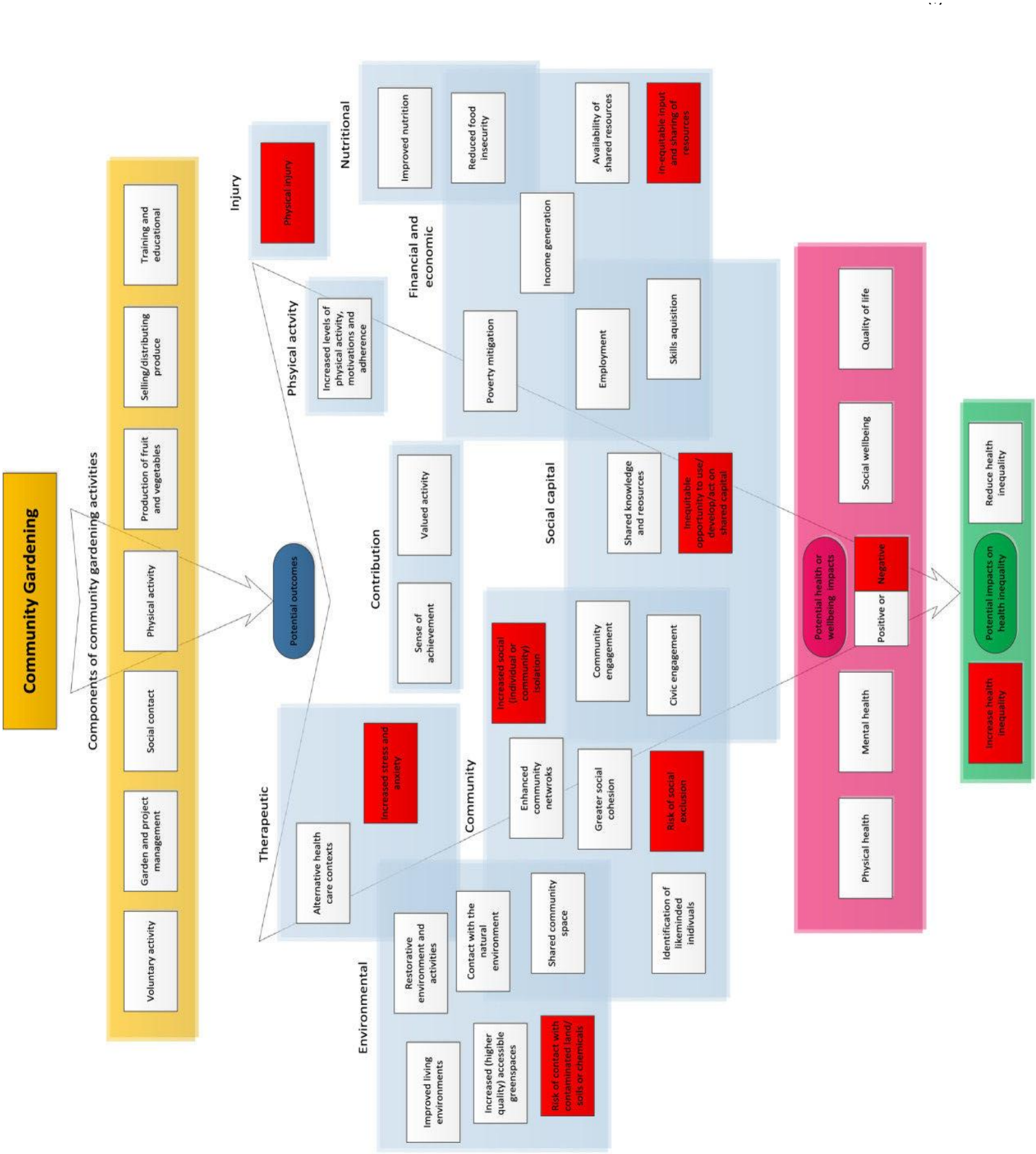
The findings from this thesis provide evidence that suggests that engagement with community gardening programmes can have a positive and beneficial impact on health and wellbeing, both physical and mental. It was also apparent that each community garden that was developed throughout the study was

unique in it's characteristics, highlighting that there is no 'one size fits all' garden to work wonders on health at a population level. The unique characteristics of local communities need to be examined in further detail to see if the perceived benefits from taking part in a community gardening programme change in different locations, even within the same region. The findings from the thesis contribute towards a greater understanding of how green space can be utilised to provide health improvement opportunities in a sustainable way, which can have an impact at an individual level as well as a local level. Although it is difficult to articulate what is the single most important benefit from partaking in a community gardening project, it is clearly evident that the positive health impacts are wide reaching.

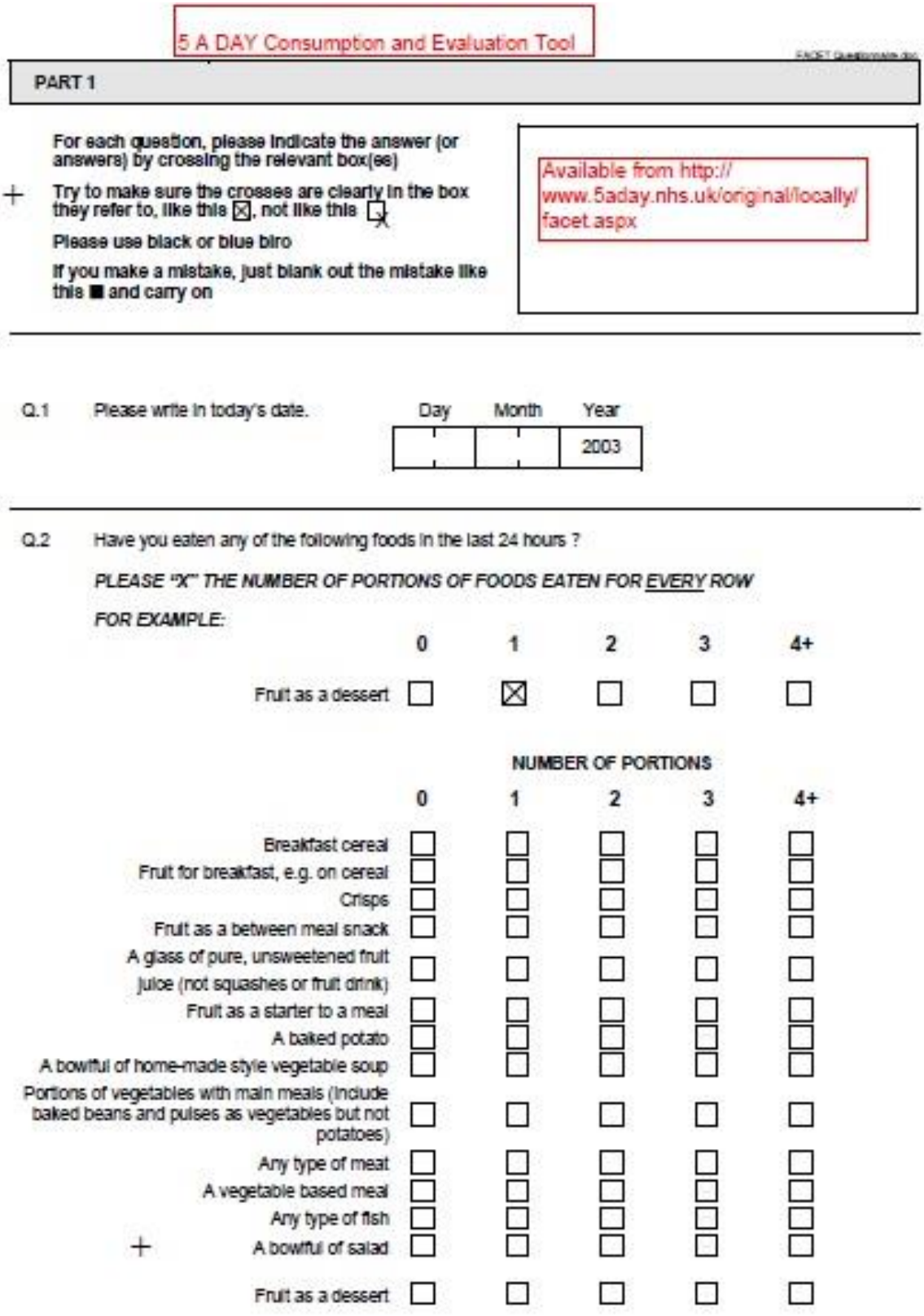
There are a number of theories that align themselves with community gardening, some more than others. The revised logic model provides strong evidence that the impact on health inequality through community gardening is a positive one, and the intervention is unlikely to be one which has a risk attached of widening health inequalities.

In addition to supporting the idea that community gardening can have an impact on health, this thesis has also identified the key elements of empowerment and sustainability, which if harnessed correctly, can be transferred to developing any health intervention which is based in the heart of a community.

Appendix A: How community gardening may impact on health and wellbeing. From Lovell et al., (2014), page 3.



Appendix B: Five-a-day Community Evaluation Tool



5 A DAY Consumption and Evaluation Tool

PART 1

For each question, please indicate the answer (or answers) by crossing the relevant box(es)

Try to make sure the crosses are clearly in the box they refer to, like this ☒, not like this ☓

Please use black or blue biro

If you make a mistake, just blank out the mistake like this ■ and carry on

Available from http://www.5aday.nhs.uk/original/locally/facet.aspx

Q.1 Please write in today's date.

Day	Month	Year
		2003

Q.2 Have you eaten any of the following foods in the last 24 hours ?

PLEASE "X" THE NUMBER OF PORTIONS OF FOODS EATEN FOR EVERY ROW

FOR EXAMPLE:

	0	1	2	3	4+
Fruit as a dessert	☐	☒	☐	☐	☐

NUMBER OF PORTIONS

	0	1	2	3	4+
Breakfast cereal	☐	☐	☐	☐	☐
Fruit for breakfast, e.g. on cereal	☐	☐	☐	☐	☐
Crisps	☐	☐	☐	☐	☐
Fruit as a between meal snack	☐	☐	☐	☐	☐
A glass of pure, unsweetened fruit juice (not squashes or fruit drink)	☐	☐	☐	☐	☐
Fruit as a starter to a meal	☐	☐	☐	☐	☐
A baked potato	☐	☐	☐	☐	☐
A bowlful of home-made style vegetable soup	☐	☐	☐	☐	☐
Portions of vegetables with main meals (include baked beans and pulses as vegetables but not potatoes)	☐	☐	☐	☐	☐
Any type of meat	☐	☐	☐	☐	☐
A vegetable based meal	☐	☐	☐	☐	☐
Any type of fish	☐	☐	☐	☐	☐
A bowlful of salad	☐	☐	☐	☐	☐
Fruit as a dessert	☐	☐	☐	☐	☐

PART 2

Please read each question carefully and "X" the answer that most accurately reflects your circumstances or views. In some questions you will be asked for your opinion on a topic, please write your answers in the box provided.

Q.1 How many portions of a combination of fruit and vegetables do you think health experts would recommend eating every day ?

PLEASE "X" ONE BOX ONLY

None	☐ 1	Five	☐ 5
One	☐ 2	Six	☐ 7
Two	☐ 3	Seven or more	☐ 8
Three	☐ 4	Don't know	☐ 9
Four	☐ 5		

Q.2 How many portions of fruits and vegetables do each of the following provide ?

PLEASE "X" ONE BOX ONLY IN EACH ROW

	0	1	2	3	4	Don't know
A small glass (150 mls) of unsweetened orange juice	☐	☐	☐	☐	☐	☐
One glass of orange squash (diluted)	☐	☐	☐	☐	☐	☐
A thin slice of tomato	☐	☐	☐	☐	☐	☐
Three heaped tablespoons of carrots	☐	☐	☐	☐	☐	☐
One medium-sized apple	☐	☐	☐	☐	☐	☐
One small raspberry flavoured yoghurt	☐	☐	☐	☐	☐	☐

Q.3 How important are the following to you in deciding how much fruit and vegetables that you eat ?

PLEASE "X" ONE BOX ONLY IN EACH ROW

	Very unim-portant	Unim-portant	Neither unim-portant nor important	Important	Very important	Don't know
The money I have available to spend on fruit and vegetables	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
Price of fruit and vegetables	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
My knowledge about ways to prepare fruit and vegetables	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
The time I have available to prepare fruit and vegetables	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
How easy it is for me to get the shops*	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
How heavy my shopping is to carry	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
Likes and dislikes of my household for fruit and vegetables	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
The quality of fruit and vegetables available	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

*any shops within walking distance

Q.4 Do you think you will increase the amount of fruit and vegetables you eat in the next year ?

PLEASE "X" ONE BOX ONLY

No, definitely not	No, probably not	Possibly	Yes, probably	Yes, definitely	Don't know
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

Q.5 By eating more fruit and vegetables, I think that people can reduce their chances of getting....

PLEASE "X" ONE BOX ONLY IN EACH ROW

	Agree strongly	Agree slightly	Neither agree nor disagree	Disagree slightly	Disagree strongly	Don't know
Stroke	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
Cancer	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
Back pain	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
Hearing problems	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
Heart disease	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

PART 3

To help us in analysing this survey, please provide the following information

Q.1 Your date of birth

Day	Month	Year

Q.2 Sex

PLEASE "X" ONE BOX ONLY

Male ☐ 1

Female ☐ 2

Q.3 Which of these apply to you?

PLEASE "X" ONE BOX ONLY

Current smoker ☐ 1

Ex smoker ☐ 2

Never smoked ☐ 3

Appendix C: International Physical Activity Questionnaire

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. This is part of a large study being conducted in many countries around the world. Your answers will help us to understand how active we are compared with people in other countries.

The questions are about the time you spent being physically active in the last 7 days. They include questions about activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Your answers are important.

Please answer each question even if you do not consider yourself to be an active person.

THANK YOU FOR PARTICIPATING.

In answering the following questions,

- **vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder that normal.

- **moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder that normal.

1a. During the last 7 days, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling,?

Think about *only* those physical activities that you did for at least 10 minutes at a time.

_____ **days per week** ⇨

1b. How much time in total did you usually spend on one of those days doing vigorous physical activities?

_____ **hours** _____ **minutes**

or

☐ **none**

2a. Again, think *only* about those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ **days per week** ⇨

2b. How much time in total did you usually spend on one of those days doing moderate physical activities?

_____ **hours** _____ **minutes**

or

☐ **none**

3a. During the last 7 days, on how many days did you **walk** for at least 10 minutes at a time? This includes walking at work and at home, walking to travel from place to place, and any other walking that you did solely for recreation, sport, exercise or leisure.

_____ **days per week** ⇨

3b. How much time in total did you usually spend walking on one of those days?

_____ **hours** _____ **minutes**

or

☐ **none**

The last question is about the time you spent sitting on weekdays while at work, at home, while doing course work and during leisure time. This includes time spent sitting at a desk, visiting friends, reading traveling on a bus or sitting or lying down to watch television.

4. During the last 7 days, how much time in total did you usually spend *sitting* on a **week day?**

____ **hours** _____ **minutes**

This is the end of questionnaire, thank you for participating.

Appendix D: SF-8 Survey

1. Overall, how would you rate your health during the past 4 weeks?

Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor ☐ Very poor ☐

2. During the past 4 weeks, how much did physical health problems limit your usual physical activities (such as walking or climbing stairs)?

Not at all ☐ Very little ☐ Somewhat ☐ Quite a lot ☐ Could not do physical activities ☐

3. During the past 4 weeks, how much difficulty did you have doing your daily work, both at home and away from home, because of your physical health?

None at all ☐ A little bit ☐ Some ☐ Quite a lot ☐ Could not do daily work ☐

4. How much bodily pain have you had during the past 4 weeks?

None ☐ Very mild ☐ Mild ☐ Moderate ☐ Severe ☐ Very Severe ☐

5. During the past 4 weeks, how much energy did you have?

Very much ☐ Quite a lot ☐ Some ☐ A little ☐ None ☐

6. During the past 4 weeks, how much did your physical health or emotional problems limit your usual social activities with family or friends?

Not at all ☐ Very little ☐ Somewhat ☐ Quite a lot ☐ Could not do social activities ☐

7. During the past 4 weeks, how much have you been bothered by emotional problems (such as feeling anxious, depressed or irritable)?

Not at all ☐ Slightly ☐ Moderately ☐ Quite a lot ☐ Extremely ☐

8. During the past 4 weeks, how much did personal or emotional problems keep you from doing your usual work, school or other daily activities?

Not at all ☐ Very little ☐ Somewhat ☐ Quite a lot ☐ Could not do daily activities ☐

Appendix E: Dissemination and training

Oral presentations

1. Postgraduate Research Conference, Queens Campus, Durham University, 10th June 2016. *'An evaluation to assess the feasibility of a community gardening intervention called 'Nourishing Neighbourhoods' which aims to improve health.'*
2. Fuse Physical Activity Conference, Newcastle University, May 2013. *'Effectiveness of commercially provided 'green exercise' space as enablers of sustained health behaviour change- a preliminary focus group study.'*

Poster presentations

1. Fuse International Conference on Knowledge Exchange and Public Health, Vancouver, 8th May 2018. *"Exploring community gardening as a complex public health intervention: an action research study."*
2. International Society of Behavioural Nutrition and Physical Activity Conference (ISBNPA), San Diego, 23rd May 2014. *'Effectiveness of commercially provided 'green exercise' space as enablers of sustained health behaviour change- a preliminary focus group study.'* '

Papers under review

1. **Connor, N.,** Visram, S., Summerbell, C., Moore, H. and Sniehotta, F. (2018). 'Effectiveness of commercially provided 'green exercise' space as enablers of sustained health behaviour change- a preliminary focus group study.' *Journal of Public Health.*

Online Blogs

1. 'A day in the life of a Pracademic'

Fuse blog: http://fuseopenscienceblog.blogspot.co.uk/2015/12/a-day-in-life-of-pracademic.html

Training

- MSc Module: Qualitative Health Research Methods - 2012/13
- Participatory action research: 2 day course with the Centre for Social Justice and Community Action, Durham University – March 2017

Membership

- Member of the Fuse Physical Activity Workshop Organising Committee

Appendix F: Study One Flyer

Active Growing

Groundwork North East and Durham University are running three focus groups in August and September to find out what people in YOUR community would like from a community gardening project. Come along and have YOUR say!

Blackhall Community Centre

Saturday August 25th, 10-11.30am,

Refreshments will be provided

For more information, please contact Natalie Connor at Groundwork NE **Tel: 0191 527 3333**
Email: Natalie.connor@groundwork.org.uk

Appendix G: Ethics committee approval letter- Study One

Durham University

Wolfson Research Institute
Improving health and well-being

Rebecca Maier (nee Perrett)
NHS Engagement Manager, Wolfson Research Institute
Chair, School of Medicine and Health Ethics Sub- Committee
Tel: 0191 334 0425
Email: Rebecca.Perrett@durham.ac.uk

Natalie Connor
PhD Student
School of Medicine and Health
Durham University
Queen's Campus
Stockton-on-Tees
TS17 6BH

27th July 2012

Dear Natalie,

Re: Ethics Application ESC2/2012/08
A focus group pilot study exploring the needs of local community members in County Durham, and their attitudes towards engaging in an allotment programme.

Thank you for sending your revisions to the above application to the School of Medicine and Health Ethics Sub-Committee.

I have reviewed the revised documents and I can confirm that all of the points raised by the committee have been addressed. I am therefore pleased to confirm Durham University ethical approval for you to conduct this study.

Please note that as custodian of the data generated for this study you will be responsible for ensuring it is maintained and destroyed as outlined in this proposal and in keeping with the Data Protection Act.

Please do not hesitate to contact me should you have any questions. Good luck, I hope that the study goes well.

With best wishes

RMaier

Rebecca Maier

Appendix H: Study One participant information sheet and EOI

Active Growing- An Exploratory Study

You are being invited to take part in a focus group exploratory study which aims to find out about your views on a future allotment/community garden project in your area. Before you decide whether or not to take part, it is important for you to understand why this study is taking place and what it will involve. Please take time to read the following information carefully.

You will be given at least 7 days to consider whether you would like to participate in this exploratory study. If you decide that you would like to take part, you will need to complete the attached expression of interest form on page 5. Please be aware that volunteering to take part in a focus group does not guarantee that you will have a place in the study, as we only require 20 participants.

I am a PhD student at Durham University, who also works for an environmental regeneration charity called Groundwork North East. Durham University and Groundwork North East are working together on this exploratory study.

What is the purpose of the study?
The popularity of allotments and community gardens over the past few years has seen green exercise (engaging in physical activities whilst simultaneously being exposed to nature) become an alternative option to simply going to the gym. The focus group is looking to find out what would encourage members of your local community to engage in a community garden/ allotment programme. The key to this study is finding out what is important to you, as a potential allotment/community garden user.

Do I have to take part?
No. It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep, and

be asked to complete the expression of interest form on page 5. If you decide to take part you are still free to withdraw at any time up until the day of the focus group without giving a reason. Participants cannot withdraw after the focus group, as this would leave the data unusable. To withdraw from the study, you need to contact a member of the research team using the contact details provided on page 4.

What will happen to me if I take part?
If you decide to take part, you will be asked to:

- Take part in a focus group.
- In this focus group, you will take part in a discussion about a future community allotment programme in your area, with a group of about 6-8 other people. This is called a 'Focus Group.' A focus group is very relaxed and casual, and you do not have to answer all of the questions, just contribute whenever you can.

The focus group will take no longer than 90 minutes, and will be audio recorded by the research team for future analysis. All data will be kept anonymous and confidential.

What are the possible benefits of taking part?
Findings from the study will be used by local health services within County Durham and organisations such as Groundwork North East to determine decisions on physical activity interventions and local environment improvements, so could benefit you as well as your local community in the future.

Are there any risks to taking part?
There are no known risks associated with taking part in a focus group. If you do experience any problems during the focus group you should let the research team know so you can discuss whether you are able to continue taking part in the study. Your participation is entirely voluntary and you may withdraw from this study at any point up until the actual day of the study without having to provide a reason.

Will what I say in this study be kept confidential?
Yes. All participants will be provided with a unique ID number. We will use this number only when discussing your information within the research team. Only the lead researcher will have access to your personal details. All information/ data collected will be stored securely

in locked filing cabinets and/or on password protected computers at Durham University and Groundwork North East. The Expression of Interest Form (EOI) will be stored separately while the focus groups are running. Once these have been completed, this information will be destroyed. Once the project is complete all of the study materials and information/data will be stored securely at Durham University and Groundwork North East for up to 5 years before being destroyed.

Please be advised that although the researchers will take every precaution to maintain confidentiality of the data, the nature of focus groups prevents the researchers from guaranteeing confidentiality. The researchers will remind participants at the start of any focus group to respect the privacy of your fellow participants and not repeat what is said in the focus group to others.

What will happen to the results of the research study?

The findings from this study will be used to help develop a future health-promotion intervention study. They may also be shared with members of the Obesity Related Behaviours research group at Durham University and Groundwork North East. It is likely that information from this exploratory study will also be published in newspaper articles, peer reviewed journal articles and maybe presented at relevant conferences. You will not be identified in any of the published articles or reports relating to this study. If you would like to receive a copy of the report, please contact your local community centre, who will hold a copy once the study has been completed.

Thank you

Thank you for taking the time to read about this study. If you agree and are selected to take part, in appreciation of your time given to this study, we will provide you with a £10 Arcadia gift voucher. This voucher can be used at eight top fashion retailers; Burton, Evans, Dorothy Perkins, Miss Selfridge, Topshop, Topman, Outfit and Wallis.

Contact for further information

Please ensure you have read and understood all of the information provided on this information sheet before completing the expression of interest form on page 5. Once you have completed the form please return it to your local community group key contact. This information sheet is for your own records. If you have any questions about this

study please do not hesitate to contact one of the researchers listed on page 4.

If you have any concerns at all whilst taking part in the study the primary researcher will be happy to discuss these with you. However, if you do have a complaint about any aspect of the study this can be addressed to Professor Carolyn Summerbell within the supervisory team on (0191) 334 0071 or at carolyn.summerbell@durham.ac.uk. If you are still unhappy with the outcome, you can raise your complaint with the Head of the School of Medicine and Health, Professor Pali Hungin on (0191) 334 0375 or at a.p.s.hungin@durham.ac.uk.

Natalie Connor

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Dr Helen Moore

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Stockton-on-Tees
TS17 6BH
United Kingdom

Tel No: 0191 334 0469

Active Growing- Exploratory Study: Expression Of Interest Form

Please complete this Expression Of Interest form (EOI) if you are interested in taking part in the study. Items marked * are compulsory and you will need to provide this information before you are able to participate in the study. Once the focus group has been completed, your personal information on this EOI will be destroyed.

Name*: _____

Address*: _____

_____

_____

Postcode: _____

Telephone No*: _____

Mobile: _____

E-mail: _____

Appendix I: Study One participant consent form

Active Growing- Exploratory Study: Focus Group Consent Form

Please read the following consent form carefully then tick 'Yes' or 'No' and initial each of the statements to confirm whether you are in agreement. Finally print your name then sign and date the form and return to [insert name of contact] at [insert location].

	Yes	No	
• I confirm that I have read and understood the information sheet provided by the research team.	☐	☐	
• I am aware that I can ask questions at any time by contacting the research team.	☐	☐	
• I understand that participation in this study is voluntary and I can withdraw from the study at any point without giving a reason up until the day of the study.	☐	☐	
• I am aware that ***the focus group will be audio recorded*** and that all participant information/data will be anonymous and kept confidential. All data collected will be stored securely at Durham University, with computerised information being stored on password protected computers. After the project is completed all the study materials and information/data will be stored securely for up to five years by Durham University and then destroyed.	☐	☐	
• I agree to take part in this study.	☐	☐	

Name: _____ Date: _____

Signature: _____

Researchers Name: _____ Date: _____

Signature: _____

Appendix J: Study One ORB Lone working policy

ORB: Work Alone Policy

Safety procedures for research staff

Research staff undertaking work outside of the office environment will be fully conversant with safety procedures in order to minimise the risks to their personal safety. The following procedures have been put in place:

1) 'Work buddy' arrangement

Research staff undertaking work outside of the office environment on their own will establish a 'work buddy' arrangement with a named colleague. This will be someone who they can inform of their whereabouts and with whom they can devise a contact and emergency alarm system.

The 'work buddy' will be informed beforehand of the details of each lone external visit. The 'work buddy' will have access to the researcher's diary where details about location, time out of the office and a contact telephone number will be detailed. In conjunction with this, a 'work buddy' form will be completed detailing the name, address, phone number of the location/ person to be visited and expected start and likely finish time of the meeting (see page 5). In doing this there is a need to balance the participant's confidentiality with the researcher's personal safety therefore the form will be kept in a locked filing cabinet which can be accessed if necessary. The form will be destroyed once the researcher has returned safely. The 'work buddy' should be informed of any changes to the visiting arrangements, or if the researcher is delayed at any stage. This is the responsibility of the researcher.

The 'work buddy' will be contacted by the researcher on arrival at their meeting and again once the meeting has been completed and they are to return to work. If a series of meetings are being undertaken, periodic calls will be made at agreed intervals (detailed on the 'work buddy' form. If visits are being undertaken outside of normal office hours an arrangement will be made to contact the 'work buddy' at home.

The 'work buddy' will have next of kin/emergency contact information for the researcher.

2) Personal Safety

As far as possible external meetings will be undertaken during office working hours, although it is recognised that this may not always be possible. The risk of

undertaking evening visits, particularly after dark will be considered and the researcher will determine whether it is safe to proceed with the meeting alone.

The researcher will carry a **fully charged** mobile phone and for easy access the contact number of their 'work buddy' and other emergency numbers will be programmed in. The phone will be switched on throughout the visit. Money or phone cards to enable use of a public phone will also be carried.

Researchers will be vigilant at all times. They should be aware of the following:

- ensure that exit doors remain unlocked and be aware of escape routes
- remain in communal rooms
- avoid sitting on a low chair
- ask that dogs be contained in a secure room
- be aware of the behaviour or deterioration in behaviour of the person they are meeting and of anyone else who may be at the specified location.

The researcher will make it apparent that other people know where they are, for example by referring to their schedule, making and receiving phone calls.

For visits which are likely to be sensitive or challenging it may be advisable to take an escort (colleague) or consider whether an alternative choice of researcher would diminish any potential risk. In some situations a researcher of the same sex may be preferable.

3) Car Safety

Researchers will travel to and from visits on main roads where possible. Car doors will be locked and valuables kept out of sight. Cars will be parked in a location which will best ensure the safety of the researcher and the vehicle, and will allow a quick exit if required (e.g. park in a well-lit location and facing the exit).

Researchers should be aware of anyone loitering near to where their car is parked. Unless they have to leave in haste, they should always check their car has not been interfered with in any way before driving off.

Researchers will ensure there is plenty of fuel in their car when conducting an external visit. A clear planned route for travelling to and from the location should be established. Unfamiliar places should be avoided after dark however if unavoidable, the researcher should take an escort (colleague) to accompany them.

4) What to do in an Emergency

During an external meeting where the researcher can make contact with their 'work buddy':

If the researcher has any doubts about their personal safety, they should terminate the visit and leave in the quickest and safest way possible. If at any point they feel threatened, they should use their mobile phone to seek assistance using a code word/phrase* agreed with their 'work buddy'. This code word/phrase should be recognised as an emergency alert by all members of the department. This will direct

the ‘work buddy’ to contact the Police and provide them with the details on the completed ‘work buddy’ form. The buddy should then phone back to tell them that help is on the way using the agreed code word/phrase response**.

(*and** to be determined by ORB staff)

If the ‘work buddy’ cannot be contacted then another contact within the department should be contacted e.g. a member of staff within the department. All staff should have their colleagues contact numbers programmed into their mobile phones.

If the Researcher fails to make contact:

If the ‘work buddy’ does not receive a call that they are expecting before or after an external meeting then they should attempt to contact the person by calling their mobile phone. If contact has not been established within **one hour** after the expected contact, then the following escalating action will be taken:

- repeatedly call the researcher on their mobile phone
- telephone the interviewee
- make a further attempt to contact the researcher by visiting the specified location
- make enquiries where possible to try to establish the whereabouts of the researcher
- notify other members of staff within the department in case they have been contacted
- contact the Police
- if necessary, contact next of kin/emergency contact detailed on ‘work buddy’ form

‘Work buddy’ Form

This form should be completed for all lone external visits.

Name of Staff Member:	
Contact Telephone No:	
Date of Visit:	
Start time of visit:	
End time of visit:	
Meeting who?	
Location Address:	
Location Telephone No:	
Car registration:	

Work buddy Information:

Name or work buddy:	
Contact Telephone No:	
	Please tick once complete:
Arrival at location confirmed	
Periodic calls made at agreed times *(please write agreed times on this form)*	
Safe departure from location confirmed and ETA back at the office reported	
Any further action required (If so, provide details):	

Appendix K: Study One Risk Assessment

University of Durham

Fieldwork - Risk Assessment

DEPARTMENT: School of Medicine and Health	**LOCATION:** Various community centres and village halls
ACTIVITY: Active Growing- a pilot study focus group	**PERSONS AT RISK:** Participants and research staff
DURATION OF ACTIVITY: November 2011-January 2012	

POTENTIAL HAZARDS:

1. **Those associated with participants feeling nervous around other members of the focus group, when sharing thoughts or discussing questions.**
2. **Those associated with researchers working alone with participants in community locations.**

POTENTIAL CONSEQUENCES:

1. **Participation in focus groups**

   Distress/ embarrassment could be caused when sharing personal information within the group setting. Due to the nature of the topic, and with participants actively volunteering to take part in the focus groups, it is unlikely that participants will feel uncomfortable.

2. **Lone Working**

   Third party interference- aggressive behaviour, distractions, abduction.

   .

EXISTING CONTROLS:

1. **Participation in focus groups**

   As participants have volunteered to take part in the focus groups, it is unlikely that they will feel uncomfortable. However, participants are made aware within the participant information sheet (Appendix 2.1) that they can withdraw at any time throughout the duration of the study.

2. **Lone working**

   The ORB Lone Worker policy will be adhered to (see Appendix 4.1).

RISK RATING (SEVERITY X LIKELIHOOD) WITH EXISTING CONTROLS

1. Severity …**MINOR**... X Likelihood …**LIKELY**… = Risk Rating …**LOW**… 2. Severity …**MODERATE**… X Likelihood …**UNLIKELY**… = Risk Rating …**LOW**…
NEW CONTROLS REQUIRED: None
RISK RATING (SEVERITY X LIKELIHOOD) WITH NEWCONTROLS
Not applicable
ASSESSOR NAME Miss Natalie Connor JOB TITLE Healthy Communities Officer SIGNATURE  DATE 02-11-11

Printed copies are uncontrolled / Reference: RA0018 / Version: 01 / Issue Date: 05.08.10

Groundwork North East

Health & Safety Risk Assessment Form

This Risk Assessment should look at Health & Safety Risks and the Controls which are in place

Activity	**Offsite Meetings**			**Reference**	**RA0018**
Approved By	Risk Assessment Group		Date Completed: 05.08.10	**Date Reviewed**	
Final Approval By	Managing Director	Signed:	Date: 05.08.10		

What are the Hazards? What are the Risks?	Risk Assessment with No controls			Risk Assessment with Controls			Who is at Risk?
	Severity	Likelihood	Risk Rating	Severity	Likelihood	Residual Risk Rating	
Third party interference – aggressive behaviour, distractions, abduction	4	3	MED	4	1	LOW	Staff, Volunteers, Participants & Members of the Public
Adverse weather conditions – exposure	4	3	MED	2	2	LOW	
Moving vehicles – crushing / impact injuries	5	3	MED	5	2	LOW	
Uneven / slippery ground – slips, trips & falls	4	3	MED	3	3	LOW	
Animals / ticks / insects – bites, allergic reaction, crushing	4	3	MED	3	3	LOW	
Manual handling - injuries to back and upper limbs	4	3	MED	3	2	LOW	

Control Measures to Mitigate Risks
Physical Mobile Phone First Aid kit Displayed ID Badges if appropriate Appropriate PPE relevant to the activity
Planning Activity checklist Research site prior to the visit commencing to identify hazards / work areas Other risk assessments as appropriate i.e. "Use of Trust Vehicles", Adhere to company visiting - risk assessments and H&S briefing Relevant up to date inoculations as appropriate to the activity e.g. tetanus, hepatitis.
Training First Aid trained staff Conflict management if appropriate Manual handling training if appropriate
Supervision Staff to adhere to lone working policy and the buddy system Adhere to appropriate supervision guidelines refer to the minimum standards for working with children, young people and vulnerable adults Be aware of weather conditions and changes whilst on site

Appendix M: Developing Nourishing Neighbourhoods: An action plan

Theme	Sub theme/s	Action/ how will we achieve this?	Resources required
Development	Access	Ensure access to the site is safe and is as DDA compliant as possible, i.e. wheelchair/pushchair can access also.	Funding for access improvements
	Facilities	Necessities on site are water access. Investigate costs of each site having a poly tunnel as well as a shelter for tool storage and participants having a place to escape from bad weather or have a cup of tea.	Funding for additional costs, so investigate local and national funding streams
	Flexibility	Areas within the community garden for vegetable growing, flowers and if enough space, a grassed area for social activity.	Something to distinguish the different areas. Space
	Condition	Working within the realm of flexibility, having some growing areas ready to start in straight away, and some that need some development work first.	Some time prior to commencement of the intervention to prepare some growing areas
	Size	By providing a range of sizes of different growing areas to respond to community needs.	Space and funding
Recruitment	Open Event	Run an open event at each of the three community gardens to publicise 'Active Growing.'	Funding, partnership working within local community to help promote event, time
	Notice Board	Buy a notice board for each site.	Funding
	Newsletter	Investigate different publicity avenues within each community so that all resources are being tapped into.	Time
	Freebies	Provide a mini starter pack for each participant, and perhaps use this as an incentive?	Funding
Social Networks	Mentor Support	When setting up the intervention, enlist the support of local experienced members of the community to help drive and deliver the programme.	Time working with local community to recruit mentors
	Volunteers	Ensuring that there is a need for a community garden in a particular area through consultation. If there is a need, then more volunteers are likely to step up.	Time
Barriers	Distance to community garden	Selecting a site that is quite central within a community	Time, partnership working with local authority and local community groups
	Security	Ensure that there is a locked entrance for the site, with members only allowed a key.	Funding
	Size	This was discussed earlier in the development section. Growing areas will come in different sizes.	n/a
	Measurement Tools	Have a reminder protocol in place for using accelerometers.	Time to pull protocol together and to contact participants

Appendix N: Nourishing Neighbourhoods recruitment poster

Appendix O: Study Two and Three participant information sheet

Nourishing Neighbourhoods- An Evaluation

Durham University is inviting you to take part in an evaluation which aims to explore a new community gardening project called 'Nourishing Neighbourhoods.' Before you decide whether or not to take part, it is important for you to understand why this study is taking place and what it will involve. Please take time to read the following information carefully.

You will be given at least 7 days to consider whether you would like to participate in this study. If you decide that you would like to take part, you will need to complete and sign the attached consent form and fill in a contact details sheet.

What is the purpose of the study?
The popularity of allotments and community gardens over the past few years has seen green exercise become an alternative option to simply going to the gym. This study is aiming to evaluate the likelihood of signing participants up to a community gardening project and whether or not they continue with it for the lifetime of the project, which is 6 months.

Do I have to take part?
No. It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep, be asked to sign the consent form (Appendix 2.2 attached) and complete a contact details form. If you decide to take part you are still free to withdraw at any time up until 31st December 2015 and without giving a reason. To withdraw from the study, you need to contact a member of the research time using the contact details provided on page 3. Even if you decide not to take part in the evaluation of this project, you can still be a participant in the project itself.

What will happen to me if I take part?
If you decide to take part, you will be asked to:

- Take part in two focus groups. One on [insert date] at [insert location] and the second on (insert date) at (insert location).
- The focus groups will involve taking part in a discussion about community gardening with a group of about 6-8 other people. A focus group is very relaxed and casual, and you do not have to answer all of the questions, just contribute whenever you can.

- Complete three short questionnaires at the beginning of the study, and at eight, sixteen and twenty four weeks. The questionnaires will be completed at (insert location) on (insert dates). It will take approximately thirty minutes to complete all three questionnaires. These questionnaires are the IPAQ (used to measure physical activity levels), the FACET (used to measure fruit and vegetable intake) and the SF-8 (used to measure quality of life).
- Have your height and weight recorded at the beginning of the study, then at eight, sixteen and twenty four weeks.

The focus group will take no longer than 90 minutes, and will be audio recorded by the research team for future analysis. All data will be kept anonymous and confidential.

What are the possible benefits of taking part?

During the intervention:

Any harvest produced from the community gardening will be available for participants to take away.

During the evaluation:

Findings from the study will be used to determine decisions on physical activity interventions and local environment improvements so could benefit you as well as your local community in the future.

Are there any risks to taking part?

During the intervention:

There are some minor risks that could occur during the community gardening project. These include adverse weather when outdoors, uneven ground on the gardening site, and injuries to your back if incorrect lifting techniques are used during the gardening project. A risk assessment has been completed for the gardening project, and control measures have been put in place to minimise any potential risk.

During the evaluation:

A potential risk from taking part in the focus group is that another member of the group breaks confidentially by repeating what has been discussed during the focus group itself. Again, a risk assessment has been carried out, and control measures have been documented to minimise this happening. Participants will be reminded at the beginning of the focus group to respect one another's views; views are to remain within the group and not to be discussed outside of the focus group.

If you do experience any problems during the study you should let the research team know so you can discuss whether you are able to continue taking part. Your participation is entirely voluntary and you may withdraw from this study at any point before the 31st December 2015 without having to provide a reason. The data you have provided in any focus groups up to the time of your withdrawal will be kept and analysed.

Will what I say in this study be kept confidential?
Yes. All participants will be provided with a unique ID number which will be used to keep all information/data collected about them anonymous. All information/ data collected will be stored securely in locked filing cabinets and/or on password protected computers at Durham University. Once the project is complete all of the study materials and information/data will be stored securely at Durham University for up to 5 years before being destroyed.

What will happen to the results of the research study?
The findings from this study may be used to help develop a future health-promotion intervention study. It is likely that information from this evaluation will also be published in newspaper articles, peer reviewed journal articles and maybe presented at relevant conferences. You will not be identified in any of the published articles or reports relating to this study. A short summary of the findings will be provided for all participants at the end of the study.

Contact for further information
Please ensure you have read and understood all of the information provided on this information sheet before completing the consent form. Once you have completed the consent form please return to [insert name of contact] at [insert location] by [insert date]. Please keep this information sheet for your records. If you have any questions about this study please do not hesitate to contact one of the researchers:

Natalie Connor
PhD Student
School of Medicine and Health
Wolfson Research Institute (Room E106)

Durham University Queen's Campus
Stockton-on-Tees
TS17 6BH

Tel No: 0191 334 0469
Email: natalie.connor@dur.ac.uk

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TS17 6BH

Tel No: 0191 334 0469

Email: helen.moore@durham.ac.uk

If you have any other concerns relating to this study, please contact the Chair of Ethics, Dr Dave Ekers:

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Tel No: 0191 334 0838
Email: david.ekers@durham.ac.uk

Appendix P: Study Two and Three participant consent form

Nourishing Neighbourhoods Study: Consent Form for Focus groups and the Community Gardening Project

Please read the following consent form carefully then tick 'Yes' or 'No' and initial each of the statements to confirm whether you are in agreement. Finally print your name then sign and date the form and return to [insert name of contact] at [insert location].

	Yes	No
• I confirm that I have read and understood the information sheet provided by the research team.	☐	☐
• I am aware that I can ask questions at any time by contacting the research team.		
• I understand that participation in this study is voluntary and I can withdraw from the study at any point without giving a reason before the 31st December 2015 when data analysis will be complete, although any data I have already provided in the focus group will be kept and analysed.	☐ ☐	☐ ☐
• I understand that if I withdraw from this study, I can still continue with the Nourishing Neighbourhoods project.	☐	☐
• I am aware that ***the focus groups will be audio recorded*** and that all participant information/data will be anonymous and kept confidential. All data collected will be stored securely at Durham University, with computerised information being stored on password protected computers. After the project is completed all the study materials and information/data will be stored securely for up to five years by Durham University and then destroyed.	☐	☐
• I agree to take due care when participating in this study, ensuring safety to myself and others.	☐	☐
• I agree for any of my quotations from the focus groups to be anonymised and disseminated in public.	☐	☐
• I agree to take part in this study.	☐	☐

Name:_____ Date:_____

Signature:_____

Researchers Name:_____ Date:_____

Signature:_____

Appendix Q: Study Two and Three personal details form

Nourishing Neighbourhoods Study

Contact Details Form

Please complete this personal details form. Items marked * are compulsory and you will need to provide this information before you are able to participate in the study. Once the study has been completed, your personal information on page 1 of this sheet will be destroyed.

Name*: _____

Address*: _____

_____

_____

_____

Postcode: _____

Telephone No*: _____

E-mail: _____

Appendix R: Study Two and Three participant consent form – week 8

Nourishing Neighbourhoods Study: Ongoing Consent Form (week 8) for the Community Gardening Project

Please read the following consent form carefully then tick 'Yes' or 'No' and initial each of the statements to confirm whether you are in agreement. Finally print your name then sign and date the form and return to [insert name of contact] at [insert location].

	Yes	No
• I confirm that I have read and understood the information sheet provided by the research team.	☐	☐
• I am aware that I can ask questions at any time by contacting the research team.	☐	☐
• I understand that participation in this study is voluntary and I can withdraw from the study at any point without giving a reason before the 31st December 2015 when data analysis will be complete, although any data I have already provided in the focus group will be kept and analysed.	☐	☐
• I am aware that all participant information/data will be anonymous and kept confidential. All data collected will be stored securely at Durham University, with computerised information being stored on password protected computers. After the project is completed all the study materials and information/data will be stored securely for up to five years by Durham University and then destroyed.	☐	☐
• I agree to take part in this study.	☐	☐

Name:_____ Date:_____

Signature:_____

Researchers Name:_____ Date:_____

Signature:_____

Appendix S: Study Two and Three participant consent form – week 16

Nourishing Neighbourhoods Feasibility Study: Ongoing Consent Form (week 16) for the Community Gardening Project

Please read the following consent form carefully then tick 'Yes' or 'No' and initial each of the statements to confirm whether you are in agreement. Finally print your name then sign and date the form and return to [insert name of contact] at [insert location].

	Yes	No
• I confirm that I have read and understood the information sheet provided by the research team.	☐	☐
• I am aware that I can ask questions at any time by contacting the research team.	☐	☐
• I understand that participation in this study is voluntary and I can withdraw from the study at any point without giving a reason before the 31st December 2015 when data analysis will be complete, although any data I have already provided in the focus group will be kept and analysed.	☐	☐
• I am aware that all participant information/data will be anonymous and kept confidential. All data collected will be stored securely at Durham University, with computerised information being stored on password protected computers. After the project is completed all the study materials and information/data will be stored securely for up to five years by Durham University and then destroyed.	☐	☐
• I agree to take part in this study.	☐	☐

Name:_____ Date:_____

Signature:_____

Researchers Name:_____ Date:_____

Signature:_____

Appendix T: Study Two and Three participant consent form – week 24

Nourishing Neighbourhoods Study: Ongoing Consent Form (week 24) for the Community Gardening Project

Please read the following consent form carefully then tick 'Yes' or 'No' and initial each of the statements to confirm whether you are in agreement. Finally print your name then sign and date the form and return to [insert name of contact] at [insert location].

	Yes	No
• I confirm that I have read and understood the information sheet provided by the research team.	☐	☐
• I am aware that I can ask questions at any time by contacting the research team.	☐	☐
• I understand that participation in this study is voluntary and I can withdraw from the study at any point without giving a reason before the 31st December 2015 when data analysis will be complete, although any data I have already provided in the focus group will be kept and analysed.	☐	☐
• I am aware that all participant information/data will be anonymous and kept confidential. All data collected will be stored securely at Durham University, with computerised information being stored on password protected computers. After the project is completed all the study materials and information/data will be stored securely for up to five years by Durham University and then destroyed.	☐	☐
• I agree to take part in this study.	☐	☐

Name:_____ Date:_____

Signature:_____

Researchers Name:_____ Date:_____

Signature:_____

Appendix U: Weather log

W/C	Site 1 (Leeholme, Fri AM) N=10		Site 2 (Barnard Castle, Fri PM) N=6		Site 3 (Horden, Thursday AM) N=7		Site 4 (Ferryhill, Thursday PM) N =13		Weather conditions that week (General comment)
	Temp (C)	Attendance	Temp	Att.	Temp	Att.	Temp	Att.	
13/7/15	1967	10	19						Bright
20/7/15	16	10	16						Overcast/dry
27/7/15	17	9	17	6	18				Overcast/dry
3/8/15	19	8	19	6	21	7	21	13	Bright
10/8/15	14	4	14	3	20	4	20	10	Raining
17/8/15	23	7	23	5	21	5	21	12	Bright/warm
24/8/15	18	6	18	4	17	5	17	8	Overcast
31/8/15	17	5	17	3	15	2	15	6	Shower spells
7/9/15	19	6	19	5	19	5	19	12	Sunny
14/9/15	19	5	19	5	16	4	16	10	Dry
21/9/15	17	4	17	4	15	4	15	7	Cloudy
28/9/15	21	6	21	5	19	5	19	11	Sunny / warm
5/10/15	17	6	17	5	16	3	16	9	Bright
12/10/15	12	5	12	4	13	2	13	8	Bright/colder
19/10/15	13	5	13	3	14	4	14	7	Cloudy
26/10/15	15	3	15	2	12	2	12	6	Showers
2/11/15	16	5	16	4	13	5	13	8	Dry
9/11/15	8	2	8	1	14	2	14	2	Rain/wind
16/11/15	8	2	8	1	11	1	11	3	Rain/wind
23/11/15	12	4	12	3	14	4	14	8	Cloudy
30/11/15 *	12	*	12	*	11	*	11	*	Heavy Rain
7/12/15*	6	*	6	2	11	2	11	7	Wind
14/12/15	12	4	12	5	14	4	14	10	Cold/dry
21/12/15	8	6	8	5	Christmas week				Very cold
28/12/15	Christmas week								
4/1/16					7	2	7	7	Rain
11/1/16					3	1	3	3	Rain and wind
18/1/16					3	3	3	3	Rain and wind
25/1/16							10	10	Cold but dry

Temperature, weather conditions and attendance figures across the sites over 24 weeks
*Week commencing 30/11/15, all sessions were cancelled. Week commencing 07/12/15, 1 session was cancelled.

Appendix V: Study Two and Three ethics approval letter

Durham University
School of Medicine, Pharmacy and Health

Shaped by the past, creating the future

Dr Angela Woods
Lecturer in Medical Humanities
Deputy Chair, School of Medicine, Pharmacy and Health Ethics Sub-Committee

Natalie Connor
School of Medicine, Pharmacy and Health
Durham University

20th July 2015

Dear Natalie,

Re: Ethics Application ESC2/2015/01
An evaluation to assess the feasibility of a community gardening intervention called 'Nourishing Neighbourhoods' which aims to improve health.

Thank you for sending the above application to the School of Medicine, Pharmacy and Health Ethics Sub-Committee for ethical review. The project was reviewed at a meeting on 21st January 2015. The committee requested some changes to the application, and I have now reviewed these as Deputy Chair. I am satisfied that all of the comments made by the committee have been addressed and I am therefore pleased to confirm Durham University ethical approval for the study.

This approval is given on the following basis:

- Please ensure that data generated for this study is maintained and destroyed as outlined in this proposal and in keeping with the Data Protection Act.
- If you make any amendments to your study, these must be approved by the School committee prior to implementation.
- At the end of the study, please submit a short end of study report (ESC3 form) to the School ethics committee.

Please do not hesitate to contact me should you have any questions. Good luck, I hope that the study goes well.

With best wishes,

Angela Woods

Appendix W: Study Three pre-intervention topic guide

Focus Group Topic Guide (Pre-Intervention)

Objectives for the focus group

- To understand what participants would want from their new community garden facility.
- To understand the barriers and enablers to participants using their community garden facility.

Introduction

- Welcome-thank you, name, description of future intervention, green exercise, community gardening.
- Explanation of focus group, recording, data protection, no right or wrong, speaking one person at a time, respect for one another's confidentiality, not discussing views outside of the group.
- Aims of the session- to obtain feedback in relation to the following themes.
- Round of introductions, name, family, where they live etc.
- Warm up game?

Development of a community gardening area

- Do you think there is a need for this facility in your community?
- Where do you think there is a general need for this facility in your community?
- Physical layout?
- Opening hours?
- Charges?
- Any other elements that you believe this facility should cater for?
- Motivation to get involved?

Recruiting members

- What has encouraged you to engage with this community gardening project?

- How could we best tell people about it? Specific things to say? Ways of communicating?

Barriers

- What might stop people becoming involved in a community garden? Why?
- How can these barriers be overcome?

Data collection during the intervention

- Is there anything you would feel uncomfortable with during the data collection process of this project?

End question

- If you had one piece of advice on how to get people like you interested in becoming involved with this community gardening project, what would it be?

Closure

- Any questions for the research team?
- Reassure confidentiality
- Thank participants for their time

Probes to use throughout

- Any ideas of how to best do that?
- Does anyone want to add or clarify an opinion on this?
- That's interesting, tell me more about that.

Appendix X: Study Three post-intervention topic guide

Objectives for the focus group

- To understand what participants would want from their new community garden facility.
- To understand the barriers and enablers to participants using their community garden facility.

Introduction

- Welcome-thank you, name, description of focus group and purpose
- Recording, data protection, no right or wrong, speaking one person at a time, respect for one another's confidentiality, not discussing views outside of the group.
- Aims of the session

General Questions (but let discussion snowball)

- What have been the benefits of a project like this?
- What were the barriers over the 6 months?
- Has there been any change in physical health- good or bad?
- Fruit and veg consumption changes? Good or bad?
- Changes in mental health- good or bad?
- Thoughts on the measurement tools and processes (Questionnaires: SF-8, facet, ipaq. BMI- height and weight?)
- Duration of the programme and sessions- timing? Frequency? Season?
- Did you feel safe?
- Tell me your thoughts on the recruitment to Nourishing Neighbourhoods?

End questions

- One thing to change within the programme? One thing that was the biggest positive from the project?

Closure

- Any questions for the research team?
- Reassure confidentiality
- Thank participants for their time

Probes to use throughout

- Any ideas of how to best do that?
- Does anyone want to add or clarify an opinion on this?
- That's interesting, tell me more about that.

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